Long-Term Vision for Water, Life and the Environment (World Water Vision)

Water-education-training (W-E-T)

Towards a sector vision of educators and those to be educated

International Hydrological Programme

IHP

Framework Paper

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WATER-EDUCATION-TRAINING

(W-E-T)

TOWARDS A SECTOR VISION OF EDUCATORS AND THOSE TO BE EDUCATED

Co-ordinated by:
International Hydrological Programme (IHP)
of UNESCO

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TABLE OF CONTENTS

Highlights of the Framework Paper on Water, Education and Training (W-E-T)

(in lieu of an Executive Summary)

Introduction

The Long-Term Vision for Water, Life and the Environment (World Water Vision) underlines the growing importance of the freshwater resources for ecosystems and in particular for humankind as a part of it. The new millennium is a welcome occasion to make overall assessments of the availability, distribution and management of water regarding its quantity and quality attributes, its utilization, consumptive use and ecosystem functions.

Management of water resources cannot be mastered alone by the professional community. It penetrates the entire society touching the different administrative entities, stakeholder groups, social classes, urban and rural populations, generations and gender. Water resources issues, like other major challenges of humankind are subject to the ongoing globalization process.

Education, training and awareness raising (education for short) have been identified as key elements in forging a world-wide strategy to prepare humankind for the challenges of the XXIst century. The concept of the "learning society" means a continuous process of adapting and reorienting approaches. This Framework Paper attempts to describe the considerations, basic principles, themes and elements as a basis for a fully fledged sectoral Water-Education-Training (W-E-T) Vision which will be formulated taking into account the outcome of the World Water Forum and further consultations with interested stakeholders. The use of the term "W-E-T Vision" in this paper is to be seen in this context.

Scope and Target Groups of the W-E-T Vision

Water-related education concerns first of all the knowledge of the hydrological cycle. This concerns the entire profile of terrestrial freshwater resources assessment, monitoring, and management. Beyond this scientific knowledge of the natural processes the W-E-T Vision should also address the demographic, technological, economic, social, environmental, governance and gender related aspects of water and its interrelations with the human society. Thus W-E-T can only be defined within the context of integrated water resources management.

The W-E-T Vision should reflect the whole scope of education, including the formative years at pre-school, primary and secondary educational levels, vocational training, university and professional education at undergraduate and postgraduate levels, lifelong continuing education and training, as well as the informal and innovative ways of knowledge and information transfer. Education via distant learning, self-study, role play and simulation techniques, internet knowledge transfer and other forms of computer-aided learning are examples of this process supplementing the traditional classroom-based methods. An additional dimension of the W-E-T Vision reflects the different target groups such as policy makers, managers within and outside the water sector, professionals, technicians, service personnel. Public awareness-raising activities need to be directed to all stakeholders and include traditionally under-served groups like women and youth. Water is everybody's business!

Within this broad picture, universities and other institutions of higher learning and continuing professional education are called upon to push the frontiers of innovation in both

content and methodology of education. This focus does not mitigate the importance to include water and related subjects into elementary and secondary school curricula. Higher education includes the preparation of teachers and trainers to their tasks to educate the young generation. In this context the essential role of research in education and training can not be over-emphasised. Addressing the growing complexities of integrated water resources management requires continuous renewal, which can only be achieved by adequate research input and the continuous redefinition of the competencies to be acquired during the periods of education and training.

Three groups of stakeholders are being targeted in the W-E-T Vision, namely, Education and Training Providers, Users and External Support Agencies. In order to match the demand for education with the supply of educators and trainers, the target groups need to interact with each other through networking and other forms of communication.

It is recognised that if education and training is to be fully effective it needs to be linked with institutional reform and enabling policy/legal frameworks which together constitute the building blocks of capacity building.

Global scenarios

The Long-Term Vision on Water, Life and the Environment envisages three global reference scenarios:

- Conventional Water World (CWW)
- Water Crisis (WAC).
- Sustainable Water World (SWW).

The analyses of the implications of demographic, technological, economic, social, environmental, governance and gender drivers and their interactions with the reference scenarios of the Long-Term Vision will constitute the underpinnings of the W-E-T Vision.

Principles

The W-E-T Vision also reflects on current professional, ethical and political principles and their implication to W-E-T. Four principles have been identified, namely:

- Principle of Environmental Awareness.
- Principle of Solidarity.
- Principle of Integrated Water Resources Management
- Principle of Subsidiarity.

Lead themes of the W-E-T Vision.

The problems of and needs for education and training must not only be considered within the confines and traditions of the "educational sector", but also within the societal context, which reflects the present day's political, economic, environmental and social interests and forces. In view of its 25 year time-span the W-E-T Vision cannot outline in detail what in one generation's time might be appropriate. But it can devise concepts, steps, elements that are flexible enough to accommodate changes and aspirations beyond our present perception.

Two lead themes are being identified for the W-E-T Vision: **innova collaboration.**

Innovation will deal with both content and technique issues. Collaboration is active, transparent and make full use of networking. The concept of collaborative clusters will encourage various groups of providers, users and External Support Agencies to work together on certain aspects of the Vision in an informal, non-bureaucratic way. Such clusters should cut across disciplines, sectors and "party lines", develop a specific product and have a limited duration. Their stated aim would be to influence the future direction of human resources development for W-E-T and the allocation of public and private resources at the national and international levels.

Collaboration however should not remain limited to the "educational world". Knowledge, competencies, research results are ultimately generated to serve society's needs. There should be collaborative interaction between this "outside" and the "educational" worlds.

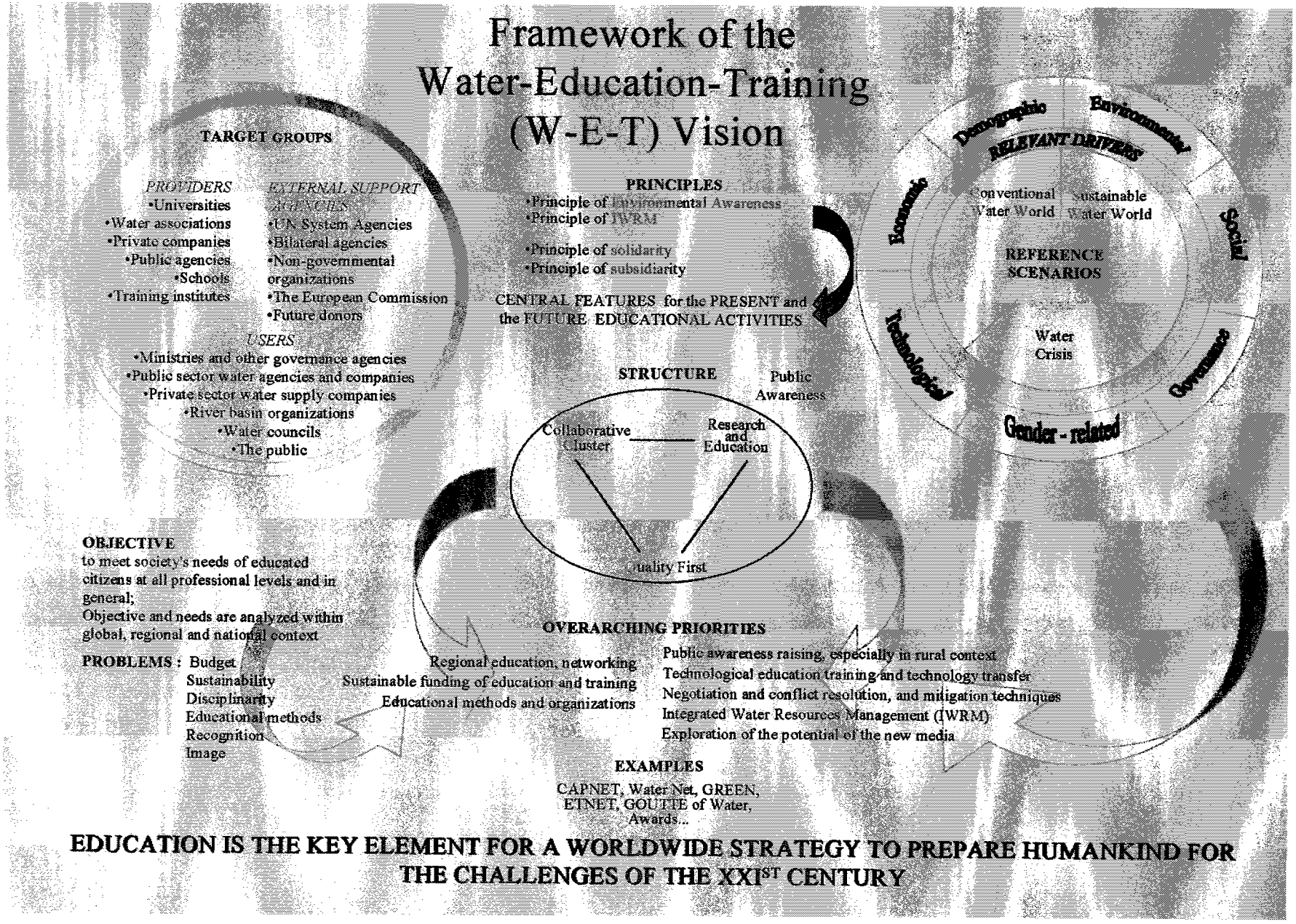
Based on the above considerations, drivers, principles and themes, the following **elements are being proposed for the W-E-T Vision and subsequent action:**

- Public awareness raising
- Education and training in technology, management, economics and environment
- Special focus on negotiation and conflict prevention, resolution and mitigation techniques
- Integrated Water Resources Management as both conceptual and action framework
- Application of the new information and communication media

The Framework Paper presents examples of promising initiatives (e.g. CAPNET, WaterNet, GOUTTE of Water, WBI distributed learning, ETNET, TECHWARE, GREEN), in support of future W-E-T actions. These are to be supplemented by others to be identified during the World Water Forum and afterwards.

In conclusion, the W-E-T Vision Framework Paper documents a serious and perhaps unprecedented attempt to create awareness, establish collaborative networks and bring about commitments for long-term efforts in water-related education, training and awareness raising. The structure of interlinked elements of the W-E-T Vision is shown on the following display.

Framework of the Water-Education-Training (W-E-T) Vision



EDUCATION IS THE KEY ELEMENT FOR A WORLDWIDE STRATEGY TO PREPARE HUMANKIND FOR THE CHALLENGES OF THE XXIST CENTURY

Preamble

...."the key to sustainable, self-reliant development is education - education that reaches out to all members of society through new modalities and new technologies in order to provide genuine lifelong learning opportunities for all ...We must be ready, in all countries, to reshape education so as to promote attitudes and behaviour conducive to a culture of sustainability."[1]

1. Introduction

The recent emergence of global initiatives, first of all the Long Term Vision for Water, Life and the Environment, underlines the growing importance of the freshwater resources for ecosystems and in particular for humankind as a part of it. The new millennium is a welcome occasion to make overall assessments of the availability, distribution and management of water regarding its quantity and quality attributes, its utilization, consumptive use and ecosystem functions.

Management of the water resources, their distribution, use and protection cannot be mastered alone by the professional community. They penetrate the entire society: touching the different administrative entities, stakeholder groups, social classes, urban and rural populations, generations and genders. Water resources issues, like other major challenges of humankind are subject to the ongoing globalization process.

UNESCO has recently identified education as the key element in forging a worldwide strategy to prepare humankind for the challenges of the XXIst century. The concept of the "learning society" (Report of the Delors Commission, 1996) means a major change in our attitudes. Fundamentally, a complete reorientation of approaches, interactions is called for, by making learning as one of the basis of human coexistence.

Similarly the White Paper of the European Commission on Teaching and Learning-Towards the Learning Society (1996), the recent International Symposium on the Learning Society and the Water Environment (2-4 June 1999, Paris, organized by UNESCO/IHP, ETNET ENVIRONMENT WATER, TECHWARE, IAHR, IAHS, OIE and co-sponsored by WMO and UNEP) has realized the need to respond in an integrated way to these emerging challenges, namely the growing concern over the resource "water" and the ever increasing need for education, training, knowledge transfer and public awareness raising at all levels. Therefore this conference concluded that the ongoing Long Term Vision for Water, Life and the Environment could further be enhanced by an additional dimension of a sectoral consultation on Water, Education and Training (W-E-T). The need to formulate a coherent educational vision with regard to water is further emphasized by the short-sighted, but general decrease of funds for both development assistance and budgets for research and education, by donor fatigue and the apparent lack of interests or ability on the part of the financing institutions to translate the oversubscribed principle of sustainability into sustainable actions in the area of education and training.

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[1] *Preface to "Educating for a Sustainable Future: a Transdisciplinary Vision for Concerted Action", UNESCO Document: EPD-97/CONF.401/CLD.1, November 1997.*

Diminishing financial resources and the simultaneously increasing need for education creates thus the external exigencies to formulate a Water, Education and Training (W-E-T) Vision as an urgent matter.

The present paper contains the framework of a sectoral vision on Water, Education and Training. The intention of this paper is to trigger contributions, first of all from the targeted professional community: educators and those to be educated, but also from those felt challenged to express their views. It is hoped that end-users, the employers of educated and trained persons will also accept this invitation to join the consultative process.

Debate, irrespective whether it is supporting the initial statements or argue with them, is the only process which helps to formulate the W-E-T Vision to become a truly sectoral statement, the vision of the professional community on sustainable education and training for improved, sustainable water resources management. Therefore the sectoral W-E-T Vision consultation was be launched during the XXVIIIth Congress of IAHR, August 1999 in Graz, Austria.

The WMO Symposium on Continuing Education and Training (CET), from 6 to10 November 1999 in Teheran, Iran, provided further opportunity to debate the emerging W-E-T Vision. The Working Paper of the W-E-T Vision was presented on the interactive website of the Vision Management Unit, with cross-reference to it in related homepages.

The first phase of debate and consultation ended in December 1999. The W-E-T Vision document has then been revised. The result, the present Framework Paper of the W-E-T Vision is going to be presented during the 2nd World Water Forum in March 2000 in The Hague, The Netherlands where UNDP, the World Bank Institute (WBI), UNESCO and IHE jointly convene a special event on Water and Education on 21th March 2000. Needless to say that a Water, Education and Training Vision will be measured by its impacts: how far its recommendations and guidance influence educators, students and donors. W-E-T Vision is not conceived as an outsider's view. It should be developed, owned and used by the very people who dedicated themselves to the noble tasks of education, training and knowledge dissemination related to water and water management.

2. Scope and Target Groups of the W-E-T Vision

2.1. A Vision for Whom?

Water-related education concerns first of all the knowledge of the hydrological cycle. This concerns the entire scientific profile of terrestrial freshwater resources assessment, monitoring, and management.

Beyond this scientific knowledge of the natural processes the W-E-T Vision should also address the demographic, technological, economic, social, environmental, governance and gender related aspects of water and its interrelations with the human society. Thus W-E-T can only be defined within the context of integrated water resources management (IWRM).

The paramount objective of the present W-E-T Vision is to contribute to the efforts to meet society's needs of educated citizens at all professional levels and in general. Specific objectives and needs can be analysed within global, regional and national contexts. Thus ideally the present W-E-T Vision Framework Paper should stimulate the formulation of regional and national W-E-T Visions analysing and reflecting upon the needs and problems within their respective mandates.

The present W-E-T Vision is conceived to reflect the inherent current issues and priorities. The present paper takes into account the existing problems with regard to budgetary constraints and sustainability of educational efforts, the dilemma of disciplinary vs. interdisciplinary education and the ongoing transition towards the use of new media as well as the questions of recognition and image of water related education and training, that of professional and educators and those of being educated. However, as education is a preparation for the future, the W-E-T Vision should also account for this perspective beyond addressing the actual (priority) objectives. The professional community is thus challenged to "visionalize" in the broadest sense of this term.

The W-E-T Vision should reflect the whole scope of education, including the formative years at pre-school, primary and secondary educational levels, vocational training, university and professional education at undergraduate and postgraduate levels, lifelong continuing education and training, as well as the informal and innovative ways of knowledge and information transfer. Education via distant learning, self study, role play and simulation techniques, internet knowledge transfer and other forms of computer aided learning (CAL) etc. are examples of this process supplementing the traditional classroom-based methods. An additional dimension of the W-E-T Vision, reflects the different target groups: policy makers, managers within and outside the water sector, professionals, technicians, service personnel etc. In addition, the public awareness-raising component should be explicitly addressed focusing on stakeholders, with particular reference on women and youth. Water is everybody's business! Within this broad setup, the professional characteristics of a sectoral vision will be reflected by a certain focus on university - postgraduate degree - and continuing professional education. This focus does not mitigate the importance to include water and related subjects into elementary and secondary school curricula. Higher education includes the preparation of teachers and trainers to their tasks to educate the young generation. It is considered that if we

fail at this level, if we accept deterioration, then all other segments of the W-E-T World fail subsequently as well.
The failure of the "W-E-T World" would happen if no research were done in the educational system, starting at the elementary level. The new educational concept can only then help to break the vicious cycle of degradation on water resources if the cultural domain, the ethical behaviour and relevant research activities would be incorporated. The crucial role of research in the education and for education as the preparation for the future can not be over-emphasized. Continuous renewal can only be achieved by adequate research input and the continuous redefinition of the competencies to be acquired during the periods of education and training. This process can only be pursued by the close co-operation of every and each stakeholder of the "W-E-T World". The present vision is written by them and for them consequently. The following target groups of the W-E-T Vision can be identified and classified as:

1- Education and Training Providers:
- Universities, university networks;
- International education and training institutes (e.g. IHE, WEDC, AIT);
- National and regional training institutes (public and private);
- Primary and secondary education;
- Open universities (for the public at large);
- Public sector water agencies which have their own training programmes;
- Private (water supply) companies which have their own training programmes;
- Consultancy firms;
- International and national water associations (e.g. IWRA, IWA, ICID).

2- Users:
- Ministries, provincial and municipal agencies, districts and community offices;
- Public sector water agencies and companies;
- Private (water supply) companies;
- River basin organizations;
- Water councils;
- Water associations;
- Individuals as recipients of Education and Training, alumni of Education and Training institutions;
- The public.

3- External Support Agencies (ESA);
- National authorities responsible for education and training budgets;
- UN System Agencies;
  (a) Specialized agencies and programmes (e.g. UNESCO, FAO, WHO, WMO, UNDESA, UNEP, UNICEF),
  (b) UN funding agencies (e.g. UNDP, GEF),
  (c) Development banks (e,g. the World Bank, AsDB, ADB, EBRD);
- The European Commission;
- Bilateral agencies (e.g. NEDA, CIDA, SIDA, GTZ);
- Non-governmental organizations (e.g. GWP, GREEN);
- Potential future donors such as business and commercial banks and private foundations.

Obviously, an interactive and feedback relationship among these target groups would be beneficial. See also Section 4.1.)

2.2 Possible Futures: Scenarios to be considered

While the starting point, the immediate needs, issues and drivers to initiate a sectoral W-E-T Vision consultation can be fairly well defined, the perspective over the time span of a generation –25 years- needs additional scrutiny. Even immediate measures to rectify the educational and training problems of today would only be really effective after a considerable lapse of time. How effective these measures and programmes may become depends also on the realization of an uncertain future of which we have only fuzzy knowledge at present. Therefore proposed actions and measures should be analysed to assess their robustness under the assumptions of different scenarios.

The World Water Vision project developed three global, reference scenarios for common use. Table 1 summarizes indicators and drivers which have been identified to characterise these scenarios, namely the:

- Conventional Water World (CWW);
- Water Crisis (WAC);
- Sustainable Water World (SWW).

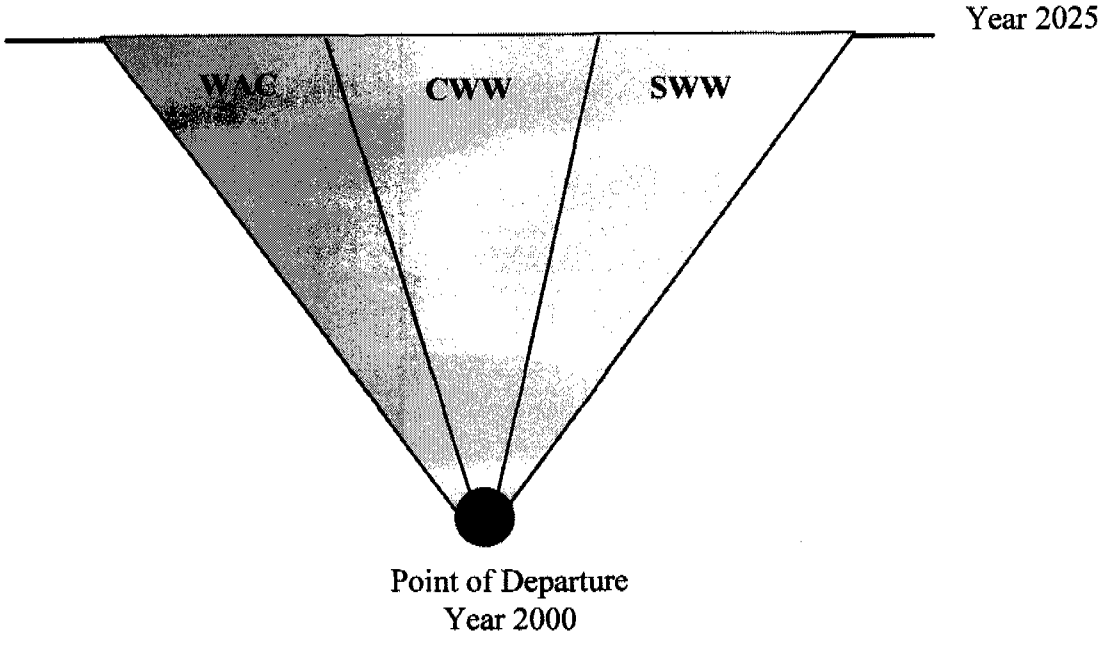


Fig. 1: The three reference scenarios interpreted as three broadening search beams.

The Messages to initiate consultations for the World Water Vision, 1999, contain a detailed presentation of these scenarios.

The three reference scenarios should not be seen as crisp, well defined trajectories for the coming 25 years, Rather they can be interpreted as three broadening search beams illuminating the darkness of our perception of the future. As the consequence the transition between scenarios remain fuzzy.

The present W-E-T Vision adopts these three scenarios irrespective the fact that the achievement of education, training, public awareness raising etc. objectives can not and should not be measured in the same way as other water-related aspirations (like % of people connected to safe water supply, sanitation, daily water rations in liter/capita, etc.).

The three reference scenarios of Table 1 are further developed for the purpose of the W-E-T Vision. In table 2 comments on expected impact on W-E-T by the relevant drivers identified in Table 1 are given.

In the context of scenarios the ultimate purpose of developing and using the W-E-T Vision is to increase the chance or conditions of realizing SWW.

TABLE 1: Overview of drivers and their value in the three World Water Vision global scenarios.

	Conventional Water World (CWW)	**Water Crisis** (as compared to CWW)	**Sustainable Water World** (as compared to CWW)
DRIVERS:		(WAC)	(SWW)
Demographic			
Total population size 2025	Total 8 billion; 6.6 in the South (S)	About the same	Total 7.5 billion (6.2 in the S)
Population growth rate	1.2 percent/year (1.4 in the S)	About the same or slightly lower (because of higher mortality)	1.05 percent/year (1.1 in the S)
Urbanization	61 percent Urbanized (56 percent in the S)	About the same or slightly lower	About the same as CWW
Migration patterns	High pressures for migration S to North (N)	Higher pressures (and stronger barriers)	Low pressures for migration S to N
Technological			
Information technologies	Widely available and used for increasing water management efficiency	Widely available, but application to enhance water efficiency not effective due to other constraints.	Widely available and used for increasing management efficiency and effectiveness (including water management) and social participation.
Biotechnology	Widely available and used for new varieties	Privately appropriated and not widely available	Widely available and used for new sustainable crop systems and water purification
Water use efficiency	Increases overall, and particularly in arid areas	Increases but much less	Increases overall, faster than in CWW
Water pollution	Pollution per unit gradually decreases	Decreases but only marginally, due to lack of access to technology	Pollution per unit decrease much faster than in CWW
New drought-, pest- and salt-resistant crops	Massive development and dissemination of new varieties leading to expansion of potentially arable land and yield increases in marginal lands	Development of resistant varieties ; dissemination curtailed in countries unable to pay the royalties	Same as CWW, but combined with ecotechnologies and integrated in new agricultural systems
Water sanitation	Investment in S grows as fast as the economy	Investment in S falls down due to economic crisis	Investment in S grows faster than overall economy; ecotechnologies used
Desalinization processes	Widely available	Expensive; only adopted in rich, arid, zones	Widely available
Economic			
Total volume of production	To 83.1 trillion (40.8 in S)	About 50 percent lower than CWW	To 90 trillion (60 in S)
Structure of production	Gradual dematerialization; agriculture growths in absolute terms	Little dematerialization in the S; agriculture growths in absolute and relative terms in the S	Fast increase of the non-material economy
Water- infrastructure (availability and condition)	Grows at same rate as the economy	Deteriorated gradually in S, or behaves erratically	Grows faster than overall economy
Trade	Universal	Some countries or regions become excluded from the global markets	Universal and strategically regulated

Social			
Lifestyles and cultural preferences	Converge to current level in the N	Preferences are the same, but real lifestyles in S and N gradually diverge	Convergence in S and N to lifestyles less material-intensive than current in the N
Poverty	Absolute poverty remains constant; relative poverty decreases	Relative and absolute poverty increases	Absolute poverty eradicated
Environmental			
Committed Climate change	Increased variability, agro-ecologic shifting	Very dramatic shifting, variability and global warming	Less dramatic than in CWW because of strong emission policies
Water-related diseases	Gradually diminishing	Gradually increasing due to low investment and climate change	Remaining only in small pockets
Salinization	Gradually reduced	Increasing	Stopped
Exhaustion and/or pollution of surface and ground water	Gradual increase	Faster increase	Stopped; water withdrawals reduced to sustainable levels
Integrity and health of aquatic ecosystems	Gradual decrease	Generalized decrease including dramatic ecological collapses	Recovering
Governance			
Institutions	Appropriate; new arrangements made	Institutional breakdown; arrangements increasingly dysfunctional	Strong and adequate institutions created; new shared goals; wide participation
Market dominance	Universal	Free market only in some rich regions	Universal, but internationally regulated
Power structure (international, national)	Asymmetrical but becoming more pluralistic	Asymmetrical and authoritarian; militarization of water and other scarce natural resources	Much more pluralistic than in CWW
Conflicts	Localized and manageable	Ubiquitous and increasing, particularly over natural resources.	Practically absent
Globalization	Accelerating	Spasmodic but widening	Accelerating

TABLE 2: Drivers, reference scenarios and their E&T implications.

SCENARIOS DRIVERS	**Conventional Water World** (CWW)	**Water Crisis** (as compared to CWW) (WAC)	**Sustainable Water World** (as compared to CWW) (SWW)
Demographic			
Total population size 2025	Increasing number of young people to be educated: pressure on educational system	Same as CWW	More chance for successfully meeting education needs of young generation increased need for CET, PA
Population growth rate	Increasing number of young people to be educated: pressure on educational system	Same as CWW	Same as CWW
Urbanization	Further concentration of learning facilities in the cities	Same as CWW	Same as CWW
Migration patterns	Language problem in education, multilingual countries/societies emerge	More than CWW impact	Less than CWW impact
Technological			
Information technologies	Chances for public, informal education, CAL use increase, innovative education methods	CWW statement regionally true, elsewhere not much change.	More than CWW impact
Biotechnology	New bio-awareness to be created through education	Less than CWW impact	More than CWW impact
Water use efficiency	Large scale PA + public info and CPD needed	Missed opportunities to launch PA and info offensives	More than CWW impact
Water pollution	PA, environmental, chemical, biological, hygienic education	Less than CWW impact	More than CWW impact
Resistant crops	Education of rural communities	Same as CWW but only regionally	Environmental awareness + education of rural communities more than CWW
Water sanitation	PA + technology teaching + training	Increase PA to avoid collapse of systems	More than CWW impact
Desalinization processes	Technology transfer + PA	Much less than CWW impact	Broader than CWW impact
Economic			
Total volume of production	Strong investment need for E&T	CWW impact can not be matched	Stronger investment need than CWW
Structure of production	Technological education need increases	Rural educational need prevails	More than CWW impact
Water- infrastructure	Increased need for CET, CPD and technical education	No job opportunities, negative feedback for E&T needs	More than CWW impact
Trade	Not relevant	Not relevant	Not relevant

Social			
Lifestyles and cultural preferences	E&T + PA needs increase	Less chance for education and training	More than CWW impact
Poverty	Educational needs as means of empowerment & poverty eradication	Depresses E&T needs and opportunities	More than CWW impact
Environmental			
Committed Climate change	Environmental awareness, rethinking rural education	More need than CWW, less means to achieve	Less than CWW impact
Water-related diseases	PA, hygienic education	Much more need than CWW, less means to achieve	Less than CWW impact
Salinization	PA, rural education	More need than CWW, less chance to achieve	Less need than CWW
Exhaustion and/or pollution of surface and ground water	Technical education need	Needs as CWW, less chance to achieve	Same as CWW impact
Integrity and health of aquatic ecosystems	IWRM + ecology training needs	Educational & training needs increased, less opportunity to match then	More than CWW impact
Governance			
Institutions	Need for IWRM education	General decrease of educational opportunities	IWRM educational need, management of education needs
Market dominance	Not relevant	Not relevant	Not relevant
Power structure (international, national)	Not relevant	Not relevant	Not relevant
Conflicts	Negotiations skills training needed	More need than CWW, less chance to achieve	Less than CWW, but wishes
Globalization	More international education	Less than CWW impact	More than CWW impact

CET: Continuing Education and Training
PA: Public Awareness
E&T: Education and Training
CPD: Continuous Professional Development
CAL: Computer Aided Learning
IWRM: Integrated Water Resources Management

2.3. Analysis of Scenarios

The analysis of the expected implications of the vision drivers on the "Water-Education-Training (W-E-T) World" under the assumption of the occurrence of the three reference scenarios CWW, WAC and SWW reveals the following:

2.3.1 Demographic Drivers

- Irrespective of the occurrence of any of the reference scenarios it is expected that the number of (young) people to be educated will increase. This increase may come as the consequence of further insufficiently controlled growth of the population, or, as in the case of SWW through the higher educational demand of a more affluent population.
- Through the ongoing process of urbanization the educational need will also be concentrated in urban centres and periurban areas. This may facilitate the task of educators, however leaves the remaining rural population relatively worse off.
- Already the outgoing twentieth century experienced large-scale human exodus, migration, refugee movements and economy-triggered displacements. All these processes cause serious stress on educational systems. First of all language problems, but also multicultural features have to be considered by educators and their curricula.

2.3.2 Technological Drivers

- The already ongoing and certainly accelerating development of the information society, more or less on global scale, will provide educators with the new media both to use in formal and informal, professional and vocational education and training. The potential of this media for public information and awareness raising is enormous.
- The potential benefits of the new media can only be fully capitalized, if teaching methods are also developed to match the available and improving technique. Courses taught on the web or by video are examples of this trend.
- Biotechnology and its potential benefits and impacts should be communicated to a large public. In this respect both research and education are challenged. The former one to provide credible assessments of potential consequences of biotechnology (especially genetically modified crops, etc.); the second to help avoiding both needless concern and exaggerated public expectations. Biotechnological developments are likely to redefine water and wastewater technology thus triggering considerable need of respective technological education at all levels. Education is the best way to ensure a rational approach towards the assessment of the potentials and risks of biotechnology.
- Water use efficiency is realized as one of the immediate requirements to make (among others) "more crops for the drop". This process is both a formidable public awareness challenge but much more, it necessitates technological education from professional down to irrigator (farmer) level. While water use efficiency is required in all water use sectors, the biggest problem and the biggest potential savings are in irrigated agriculture. It is expected that biotechnological exploits will also enable water savings, thus underlining the need to develop new techniques and their use to be disseminated. Should the WAC Scenario to become a reality the inherent missed educational steps would further aggravate the situation.
- Water pollution can be considerably reduced by public awareness campaigns raising of hygienic standards through education and public information.
- Resistant crops, either traditionally bred or genetically modified once decided to be used wide scale, would need proper introduction to the agricultural communities.

- Water sanitation needs are expected to trigger considerable technology transfer and education along the whole profile from professional education to public information.
- Desalinization is expected to become cheaper due to the anticipated decrease of energy prices and improved technology. These research results must be translated through technology transfer, education and training into common practice in parts of the world where desalinization is a viable option to satisfy water demands.

2.3.3 Economic Drivers

- Economic development, even outside of the immediate water sector would imply strong improvement of education and training, especially focusing on the provision of the respective technological and service capabilities needed by the growing economy.
- The structure of the economic production has an influence on the E&T needs. Industrial and agricultural development tendencies imply different educational and training needs.
- The water infrastructure, its creation and maintenance, needs technical education at all levels, including CET and CPD. In case of WAC this need may decrease considerably.

2.3.4 Social Drivers

- Improved social security, affluence and the desire to keep this status can be seen as strong stimuli for the increase of E&T and PA raising activities.
- Poverty on its own constitutes a very "negative" driver unless there is the political will and economic power to eradicate it. In this case E&T become one of the most essential means of empowerment to break the vicious cycle of poverty.

2.3.5 Environmental Drivers

- The observed tendencies of the anticipated climate change imply the need for increased PA raising as well as reorientation of the agrarian population (new crops, irrigation techniques, water availability and distribution, extreme events, etc.).
- Water related diseases are credited to cause millions of deaths annually. PA, especially for public hygiene, is a must.
- Salinization is considered as the consequence of inappropriate agricultural practices. Therefore its avoidance and management, once occurred, is closely related with PA and massive rural educational programmes.
- The lack of freshwater of proper quantitative and qualitative characteristics would have to trigger, beyond public awareness raising, research and well conceived technological education addressing both traditional and high technologies.
- The environmental concern, the realization that healthy aquatic ecosystems are needed for sustainable future, together with the logically emerging new management paradigm of Integrated Water Resources Management (IWRM), imply the need for ecological education for both the future generation and in form for CET and CPD also for the present generation of professionals. IWRM on its own should also be moved from conceptual stage into fully-fledged "operationalization" implying more research and education (R+E) together with education of participatory decision making techniques and PA raising.

2.3.6 Governance Drivers

- IWRM, while could be identified as a "brainchild" of holistic views and subsequent concepts imply also redefinition of role and form of governance. In this respect massive educational efforts are needed both technical, ecological and in legal-administrative sense.
- IWRM –once operationalized- would not only enhance the long-range efficiency of caring for and sharing of water. It would expose potential conflicts more pronounced. Conflict

mitigation and resolution will be very much part of the daily tasks of water managers of the early 21st century. Therefore the educational need for the conflict resolution, negotiation skills, and public participation processes will substantially increase at all levels of governance and public involvement.

- Globalization would not make halt and exclude the "water world". International (joint) education of the future professional generation is the appropriate answer.

2.3.7. Gender-related Drivers.

While the original reference scenario setting and consequently Tables 1 and 2 do not include gender issues as potential drivers, these are certainly relevant as far as education and training, these important steps towards gender equity and empowerment are concerned.

Different needs and priorities of women and men should be recognized. As far as education and public participation is concerned women should acquire capabilities to express their needs and let their voices be heard in IWRM.

2.4. Overarching Priorities

Section 2.3 summarizes the analysis of the expected educational and training implications of the three reference scenarios and the inherent drivers. This section identifies those educational and training activities that seem to be necessary irrespective of the occurrence of any of the reference scenarios or in-betweens.

Based on Section 2.3 the following issues can be mentioned as the basic set of potential overarching priorities of the "W-E-T World":

- Public awareness raising, especially in rural context.
- Technological education, training and technology transfer.
- Negotiation and conflict resolution and mitigation techniques.
- Integrated water resources management (IWRM).
- Exploration of the potentials of the new media, learning to use them.

The immediate "consequence" of identifying IWRM as a priority in Section 2.3 implies also that IWRM should not remain at conceptual level as far as W-E-T is concerned. Rather it is a call for a new paradigm to be consequently pursued at different levels of water management practice and thus also that of education and training.

Given that along with IWRM Section 2.3 emphasized the importance of PA, technological aspects and negotiation skills the three major thrusts within an IWRM dedicated education are clearly defined.

The "W-E-T World" faces also the challenge emanating from the vastness of its global task (to be implemented however at regional, national and first of all at local levels!). Parallel to organizing and funding to sustain and to accelerate the educational drive, educators have to select among the existing or even develop new appropriate educational methods along with exploring the proper use of new media.

3. Principles of the W-E-T Vision

3.1 General Comments

Chapter 3 summarizes the principles believed to be essential for the present and even more for the sustainable future of W-E-T. Two of these principles are of fundamental nature, followed by two principles which have guidance characteristics ; one for the content and conceptual framework of W-E-T, the other one is to guide the proper choice and level of international involvement in W-E-T.

3.2 Principle of Environmental Awareness

Environmental awareness in water resources management is reflected, at present, in the somewhat peripheral requirement of environmental statements, impact assessments and action plans associated with the "real" water resources development plans or management activities, but usually not as integrated parts of them. As future generations of water resources experts will emerge, this duality should disappear. Environment-mindedness must become one of the basis of engineering, resources management and scientific concern. Unless this new "attitude" is incorporated into the - at present still rather disciplinary - approaches, the concept of integrated water resources management and the overall requested environmental remediation could not be fully implemented. The education of environment mindedness cannot be seen as an *ad hoc* action but as a task for a generation to gradually train academic and professional teachers and trainers. First to enable them to convey principles, techniques and above all the mentality to their students and trainees. Consequently, the W-E-T Vision should make provision to concentrate on means and intellectual input towards the environmental education of educators in order to launch a "snowball effect".

In a broad sense the environment mindedness implies the adherence to the principle of conflict modelling, avoidance and resolution between the objectives of mankind and the requirements of nature in order to secure sustainability. The principle of a "new water ethics" (as defined by UNESCO in 1997 during the first World Water Forum in Marrakech, Morocco) extends this environmental mindedness with additional dimensions, including the basic human right to safe drinking water, the principle of equity in water-sharing, the conflict mitigation in the use of transboundary waters, etc.

Like environment mindedness, the "new water ethics" has also important educational implications. However, the professional "breakthrough" can only be achieved through the educational "operationalization" of these principles. Therefore, the W-E-T Vision should give due emphasis to sensitize educators, to develop respective material, to provide case studies, both success stories and negative examples. As education is the key towards sustainability, this key should "match the lock" and produce graduates, trainees, etc. who absorbed the above-mentioned principles and able to translate them into practice.

3.3 Principle of Solidarity

The principle of solidarity in the context of W-E-T is the expression of the profound human compassion for problems which can impact any of us. Water issues are global ones, however crises, shortages, ecological disasters, floods and droughts may be regional or local phenomena. Yet, solidarity implies that water is everybody's business and a water problem, anywhere in the world, matters everybody. Consequently education and training related problems, as being closely associated with our aspiration of a common sustainable future are challenges to be faced together. The principle of solidarity implies help, first of all as assistance for self-help. Solidarity is one of the emotional basis for co-operation. International IGO's and NGO's have predominantly been created to translate the solidarity principle into practice. In terms of education and training solidarity can be emphasised and implemented through scholarships, co-operative frameworks, exchange programmes, monetary and in-kind donations and soft loans.

However solidarity should not be interpreted as a mandate to create uniformity, imposing educational and training programmes, curricula and syllabi.
Solidarity is neither a right to be convoked seeking external help without appropriate efforts and contributions by the beneficiaries themselves.
Therefore the principle of solidarity can not be separated from the principle of subsidiarity (see section 3.5).

3.4 Principle of Integrated Water Resources Management

Water resources-oriented education should be conceived by keeping in mind the specific contribution of each subject (sub-discipline) to the overall scope of integrated water resources management. This statement is crucial as far as the entire educational infrastructure is concerned, but it certainly becomes more than a "guiding principle" as far as the different forms of continuing education and training, on the job training, etc. are concerned. The principle of integrated water resources management does not negate the importance of the individual disciplines and the academic virtue of the in-depth teaching of and research in particular subjects, however it clearly states and accepts the applied characteristics of water resources-related research and education. The acceptance and observation of this social demand would not only enhance the efficiency of the educational efforts but will certainly trigger a positive feedback towards improved water resources development and management.

3.5 Principle of Subsidiarity

Education, especially that of the children implies a very close relationship between educators and those to be educated. Therefore any initiative, which ensures education within a uniform cultural and linguistic set-up, should be stimulated. Education taking place within national framework is likely to be more efficient than within an international one.

The principle of subsidiarity implies that any E&T activity should be executed at the "lowest possible" level. Intergovernmental organizations should get involved in the implementation only upon request by national governments.

On their part, international organizations, programmes and initiatives derive their justification from the fact that they fulfil tasks and provide services and that the Member States

alone would not be able to deliver. International organizations may also assist Member States to achieve the status of self-sufficiency and the ability to provide services like professional education, training, etc. themselves.

As complementary to this general mandate, international organizations should not execute tasks that national governments, NGO's or other organizations wish and can perform.

Therefore, to the exception of tasks like training needs and programme assessment, quality control, accreditation or advice to their respective water resources educational activities international organizations should not be involved in educational activities in the water sector at the national or subnational levels. Even international educational and training modules, courses, degree programmes, etc. can be organized by national institutions, NGO's, universities, private companies, etc. They could, however, be conceived as national endeavours seeking moral endorsement and professional acknowledgement of international organizations. In spite of these connections, such endeavours may remain fully within the sovereign competence of a government as far as concept, financial support and execution of the respective programme are concerned.

4. Key Elements of the W-E-T Vision.

4.1 Introduction

An educational and training vision is based on the synthesis of different aspects highlighted in the preceding chapters. Education-related problems have to be solved in order to be able to respond to actual educational needs. However, both problems and needs must be viewed at within the prevailing societal context, which in turn, reflects present day's political, economic and ethical constellation. The analysis of today's overall cultural situation cannot be the purpose of the W-E-T Vision but one must be aware that a vision can only be understood as an expression of the prevailing intellectual perception and aspirations. By considering the timespan of the W-E-T Vision covering a period of 25 years it will be obvious that this statement cannot outline in detail what in one generation's time might be appropriate. But the W-E-T Vision should devise concepts, steps, elements that are flexible enough to accommodate changes and aspirations beyond our present perception. Obviously the key elements of the Vision of the W-E-T World must reflect the four underlying principles.

The W-E-T Vision can be visualized as a process set into motion, to reinvent itself along the course of time. This process can be characterized by its double lead themes, namely innovation and collaboration.

"Innovation" would deal with both content and techniques. It represents the duality of research and education, but also that of research for education.

"Collaboration" represents both the consultative process of formulating the W-E-T Vision but it stands also for its realization, capitalizing on joint experience, resources and efforts within the frameworks of national, regional and global networks. The realization of Collaborative Cluster (CCs) will encourage various groups of providers, users and External Support Agencies (ESAs) to work together on certain aspects of the Vision in an informal, non-bureaucratic way. Such clusters should cut across disciplines, sectors and "party lines" to develop a specific product. Their stated aim would be to influence the future direction of human resources development for W-E-T and the allocation of public and private resources at the national and international levels. CCs may have limited timespan to remain flexible.

Innovation would than play also a role in conceiving new CCs, whereas collaboration (next to competition and curiosity) forms also a pillar of Research and Education (R+E). Needless to say that both R+E and CC should aim to be implemented at high quality levels thus the aspiration of "Quality First" (QF) must be seen as the ultimate driving force for educational and training concepts and activities and thus also for the W-E-T Vision.

Collaboration however should not remain limited to the educational "W-E-T World". Knowledge, competencies, research results are ultimately generated to serve society's needs. There should be collaborative interaction between this "outside" and the "educational" worlds. Fig. 2. shows a "shell", being associated with the interface between the public and the educational world. Collaboration across this interface includes in terms of education Public Awareness (PA) raising, but also information provided to policy makers and the unavoidable lobbying for the sake of the W-E-T World itself. Fig. 2. and the term R+E inevitably refer to higher and continuing professional education. Similarly however Practice and Education (P+E) could be envisaged at technician and vocational training levels. Likewise Behaviour and

Education (B+E) could be the corresponding leitmotiv for elementary or pre-school levels underlining the fact that the basic human reactions and behavioural approaches are "coded" at very early age. The present W-E-T Vision elaborates the above indicated interactions for R+E, CC, QF and PA.

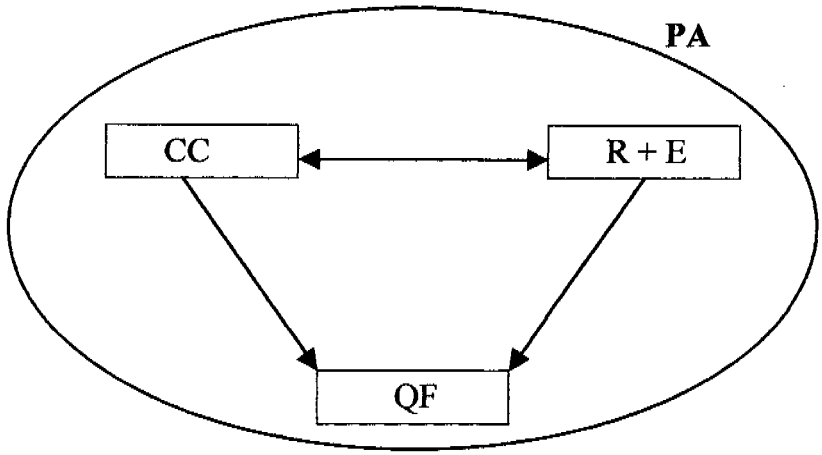


Fig. 2: ***Interaction of key elements of educational efforts.***

4.2. R+E: Research and Education

Research and (higher) education are two faces of the same coin and they always go together. Under ideal circumstances, a university will keep a sound equilibrium between the two. Research and technological development are both producers of new knowledge and skills and, therefore and necessarily must be linked with education and training. Education and training activities in turn are for the benefit of the end-user that pays for the research. The R+E symbiosis foresees:

- Exploitation of research results through pilot and demonstration projects;
- Quick transfer of new knowledge and skills through short courses and seminars or workshops;
- Production of teaching materials using both classical and new learning technologies and methods (research for education).

The linkage between research and education therefore cannot end with the publication of research results in a scientific journal but these results must find their way into the teaching process (formal, informal and public information). This approach goes parallel with the globalization of science, which implies both competition and co-operation among different stakeholders, such as universities, research institutes, public and private, companies and the end-users in general.

In this respect the answer to competition is QF "Quality First" and that to co-operation is CC "Collaborative Clusters". Thus R+E thrives on both "Innovation" and "Collaboration".

4.3. CC: "Collaborative Clusters"

Collaborative clusters can be defined as groups or organizations located in different places (countries). They are likely to be of similar structure, but even different organizations could be clustered to achieve common goals. In the context of the W-E-T Vision, the common goal is "R+E" in a "QF" perspective. CCs facilitate and enhance the cooperation for research and education following the above-described systematic approach. The type of cooperation, the level of commitment, the regional extension, the kind and size of partnership, the structure of the collaborative cluster, are dependent on the declared aims, objectives, means and funding potential. Collaboration requires mutual trust among partners but also certain diversity of means and of the ways of execution.

A collaborative cluster may be an ad hoc measure for a clearly defined purpose and outcome. In many cases, however an ad hoc set-up will not suffice and the partners will look for a long-term solution in form of a network. A network needs more than a momentary understanding or working agreement, it conditions:

- A code of conduct with clear aims and identified objectives;
- Trust and transparency in operation and activities;
- Minimization of duplication of activities;
- A "flat" structure, possibly without hierarchy (except some sort of steering mechanism) and with little bureaucracy;
- An efficient and cost-effective operation
- Flexibility , innovation and "open" mindedness
- Generating income and financial support from different sources.

These principles look easy and quite obvious. In regarding networks existing over a longer period, one cannot ignore the danger of loss of flexibility and innovative character and, on the other hand, the danger of institutionalization and establishment of bureaucracy with the inherent loss of momentum and creativity. The collaborative clusters then risk to become inert, to exist for themselves rather than for the envisaged goals. By sustaining interactions through the PA interface enabling CCs to identify societal needs and trends and to respond to them in the formal, informal and public educational domains. ESAs could have substantial influence upon CCs through coherent, future-oriented funding policies and procedures.

4.4. QF: Quality First

The systematic R+E approach and CC or network structure cannot be successful if the "quality first" aspiration is not pursued. It is the guarantee for long-standing results and continuing improvement. Quality assessment is the primary instrument to monitor the achievement of the QF aspiration. It generally starts with a "self-assessment" on the basis of the analysis of education and training needs among the target groups, of the design, implementation and delivery of the "products" and their evaluation for efficiency and effectiveness. Yet, a self-assessment is rarely fully sufficient. Much more effective is an assessment by an outside auditor, provided neutrality and independence are fully given. If fully independent, the external auditing will deliver results with a high degree of reliability. Peer

review, or accepted international validation practices (through a selected agency or mutually among CCs) could enhance this process.

Depending on the nature of the activity, the quality assessment will not only help to achieve better results, it will also foster the reliability of the quality of the "product", the graduate of educational or training efforts. Ultimately it will pave the way towards certification and possibly also for accreditation. If an education or training activity is to be attractive, it should not only increase knowledge and skills, or eventually provide competencies; it should also deliver tangible results in the form of accreditation, for example, through degrees.

The general description of the combination of (a) research and education R+E, (b) collaborative clusters CC, and (c) "quality first" QF should serve as a common denominator for all educational activities conceived or executed within the framework of the W-E-T Vision. This approach will support competitiveness, effective networks and a quick transfer of research results while ensure highest quality standards.

4.5 PA: Public Awareness

Public Awareness creates a "shell" of educational and training world. As such, it serves the purpose of exchange. In an outward-oriented flux, educational efforts should target either directly or as an essential by-product, the general public, translating scientific results and information into common, understandable messages and techniques to communicate them to the target groups, among them principally to political decision-makers and the youth.

An other virtual, inward flux should influence research and education, respective networks and quality assessment. This flux can be interpreted as public inquiries, social needs, political tendencies, research priorities, etc. set by the contemporary society. It is essential for the W-E-T World to sense these tendencies and "messages" and to translate them into appropriate responses.

The present W-E-T Vision has repeatedly stressed that educational issues and training activities are not only the concern of education specialists, teachers and students. The whole education and training field forms part of the societal environment and - certainly to different degrees - concerns everybody. Educational problems may be somehow remote for the normal citizen: for many people, the educational world is a stable matter outside their daily business and life. However, politicians, decision-makers, public a private employers, production and finance, all influence but are also influenced by the educational patterns and by the quality of the products of the educational system. One cannot expect the "outside" world to deal with educational problems. The educational world has to create an interest in and awareness of itself and for itself. In discussing the key elements of the W-E-T Vision reference has been made to the societal environment of all educational matters and training activities. Hence, one must exceed the confines of the education and training world and incorporate the representatives of relevant external activities in the cooperative clusters. Thus, public awareness means much more than nurturing public interest in water problems. It implies to raise profound commitment of politicians and decision-makers, to convince them that society's ability in mastering future water problems is directly proportional to today's investment in education and training of water-related professionals and the public at all levels.

Such investment includes the infrastructure (buildings for teaching), staff for research and training, funds for research, and also for the trainees. Awareness means to be conscious that today's policy in terms of staff and funds has a slow payout rate but that investments in

education and training are the only ones, which never fail. Therefore, the permeability of the PA shell in Figure 2. is the key of success for both the W-E-T Vision and the "W-E-T World" itself.

5. From Vision to Action

5.1. General Comments

The previous chapters have analyzed the consequences of the possible "Water Futures" as far as education and training are concerned. The priority areas have been identified, principles set and the elements of the "W-E-T World" have been outlined with their interlinkages to respond to perceived needs and tackle the problems of W-E-T. Innovation and collaboration have been selected as the key ideas to develop not only the Sustainable Water World, but also a sustainable "W-E-T World" to provide the necessary human resources. The question is, at this point, quite justified : how far the "W-E-T World" is able to respond to the expactations and turn the W-E-T Vision through appropriate actions into reality?

Needless to say that funding is the "a" and "o" of the "W-E-T World". This statement is an appeal of the "W-E-T World" to the political decision-makers controlling national and international budgets and donor priorities. Adequate, sustained responsible funding is the prerequisite to shape a desirable Sustainable Water World (SWW) through E&T.

However a W-E-T Vision of educators and those to be educated should not remain limited to express needs, appeals or requests. It must show the contribution of the "W-E-T World" itself. The solution of common problems, but also solidarity, dictates that the "W-E-T World" joins forces, combines knowledge and finds the most efficient and cost-effective ways to address the issues in E&T. In this respect, networking is not a buzzword to placate the thrust "collaboration", but it describes the best possible contribution of the "W-E-T World" itself. Innovation of the subject but also that of the delivery methods was and is the primary responsibility of the "W-E-T World" within the R+E focus.

Section 5.2. will summarize some examples or individual suggestions on how the W-E-T Vision should be turned into reality through E&T actions. Furthermore this section provides information on both conceived and ongoing collaborative efforts from "train the trainers" types of programmes through interuniversity partnerships and exchange programmes to public awareness raising partnerships for the youth. These examples do not refer in detail to examples of classical educational and training efforts and programmes irrespective of their undeniable importance and results. It is understood that the W-E-T Vision does not seek to replace but rather to enhance the existing educational and training programmes, courses and efforts.

5.2. Concepts and examples.

The following examples and ideas are presented in an overview (Table 3). This table also classifies the examples whether they primarily respond to R+E, CC or PA.

Furthermore in a series of boxes and displays some descriptions and explanations are given. Most of these examples are written by or substantially based on the voluntary input of contributors. Thus Section 5.2. is an illustrative, rather than selective sampling. It does not aim that only the initiatives presented here deserve attention. It is also an invitation to everybody to debate concepts but also to create and provide further examples and thus ultimately join the actions to transform a vision into reality.

Table 3.

Initiative	Initiator/Donor	Target Groups	Features	Primary Focus	Status
CAPNET	UNDP/The Netherlands, GWP Associated Programme	Regional networks of IWRM training institutions, Professionals active in various fields of water management	IWRM-dissemination, capacity building for IWRM trough HRD	R+E, CC	Conception
GOUTTE of Water	UNESCO-IHP	Universities and postgraduate degree education	Umbrella organization of UNITWIN and other educational networks	CC, R+E	Conception
WaterNET	IHE/The Netherlands	SADC, South African Universities MSc Programme	IWRM-oriented MSc Degree	R+E	Operational
L'eau et la vie	SID (NGO)	Youth between 10-18 years	4-year-programme, off-curricular education, journalistic approach	PA	Completed
TECHWARE	European Commission	Students, professionals	University/enterprise training partnership	R+E, CC	Operational
ETNET Environment-Water	Free University of Brussels/ SOCRATES Programme of EU	Universities, students, CET-providers, end-users	Interuniversity and intersectoral network	CC, R+E	Operational
STEM	Prof. Ervine	W-E-T World	Framework	R+E	Conception
IW : LEARN	UNDP	Professionals	CPD, CET	R+E	Operational
WET	Montana, State University	Teachers and trainers	Educational modules	R+E, PA	Operational
GREEN	GREEN Belgium	Children, adolescents	Youth education	PA, R+E	Operational
ETNET 21	European Commission	Universities, research institutes	Co-operation network, integrator	CC, R+E	Conception

A. Concepts, Project Frameworks and ESA Mission Mandates

A.1.

Water: Capacity Building for Sustainable Management of Water Resources and the Aquatic Environment; A Strategic Framework for UNDP

UNDP's water strategy can be stated as "Capacity building through and with governments and civil society for the management and use of water resources and the aquatic environment in ways that reconcile poverty alleviation and environmental protection".

The instruments used by UNDP for capacity building are:

Policy reform

- reform and adjustments in legal and regulatory frameworks; and
- taking a comprehensive, cross-sectoral, holistic view of water resources.

Institution building

- reform and adjustments in administrative procedures and accountability;
- local and international assistance in reviewing and analyzing present institutional and economic arrangements;
- decentralization;
- autonomy of management organizations; and
- changing managerial systems and organizational culture.

Human Resources Development (HRD)

- strengthening local capacity builders;
- workshops and seminars to train staff;
- education to acquire new skills and attitudes;
- data base and research capacity development; and
- use of information and communication channels.

Finance

- local funding and financing mechanisms.

A.2.

IHE Mandate

IHE - the International Institute for Infrastructural, Hydraulic and Environmental Engineering - is a centre of expertise in the fields of water, the environment, and infrastructure. The Institute's reputation is firmly based on its achievements in postgraduate education and training at Masters and PhD levels, and on the quality of its R&D and consultancy services, focusing on institutional and human resources capacity building. In over 43 years, IHE has trained more than 12,000 engineers and scientists from all over the world.

Established in 1957 and based in Delft, IHE is firmly rooted in the Dutch water sector and its associated knowledge networks and institutions..

A.3.

UNESCO-IHP's Mandate in W-E-T

UNESCO has recently identified education as the key element in forging a world-wide strategy to prepare humankind for the challenges of the XXIst century. The concept of the "learning society" calls for a reorientation of approaches.

The International Hydrological Programme of UNESCO, the sole fresh-water oriented research programme of the UN System is obliged to respond in an integrated way to these emerging challenges, namely the growing concern over the resource water and the ever increasing need for education, training, knowledge transfer and public awareness raising at all levels.

Limited financial resources and the simultaneously increasing need for education creates the external exigencies to formulate and to execute IHP's activities in the area of water-related education and training for the remainder of the present Vth phase of IHP, and particularly of the VIth phase 2002-2007.

Irrespective if its traditional name, the International Hydrological Programme of UNESCO does not only address hydrology in research and education, but rather the entire scientific profile of terrestrial freshwater resources assessment, monitoring and management. As far as its scope in E&T is concerned it corresponds with the actual thrust of the ongoing phase of IHP. However, as education is a preparation for the future, activities should also account for the inherent perspective beyond the actual objectives.

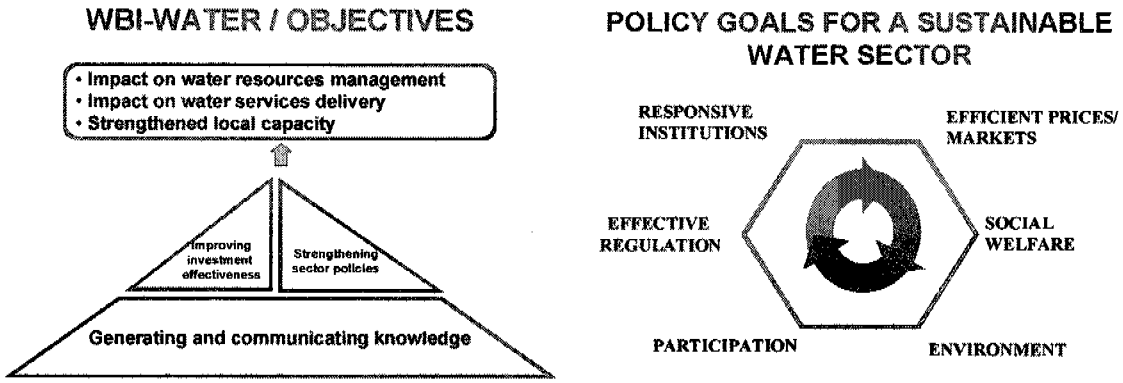
In Phase V of IHP, Theme 8: "Knowledge, Information and Technology Transfer" (KIT) reflects the whole scope of education, including pre-school, primary, secondary and tertiary educational levels, lifelong continuing education and training, as well as the informal and innovative ways of KIT. In addition, the public awareness raising component is explicitly addressed. Within the broad set-up, the characteristics of IHP, as a scientific programme will be reflected by emphasising university - postgraduate degree - and continuing professional education. As far as public awareness is concerned, priority target groups are the youth and the present-day (political) decision-makers.

World Bank Institute

Water Policy Reform Capacity Building Programme

The World Bank recognizes that knowledge and capacity building are critical to eradicating poverty and achieving sustainable development. The World Bank Institute is the Bank's knowledge and training arm, and as such, is actively engaged in water issues. The Institute's Water Policy Capacity Building Program assists developing countries prepare and implement policies leading to sustainable water resources management and water services delivery, by providing knowledge services on policy issues to a wide range of stakeholders. Since its inception in 1994, the program has reached over 8,000 decision-makers and stakeholders in 45 countries, leading to significant policy reforms. This demand-driven program is supported by the Bank, donor governments, and client countries.

WBI believes that only through sound analysis and sharing of knowledge among all stakeholders of development can sector policies be strengthened and investments be made effective and sustainable. And only then can lasting solutions be achieved in solving our water challenges. As shown in the following figure, the program focuses on key policy issues and responses involving the creation and use of markets; economic and environmental regulation; and approaches promoting inclusion and participation.



WBI's Water Policy Capacity Building Progam: Objectives and Thematic Priorities

As the international community considers a new World Water Vision, WBI is renewing its water learning agenda, offering opportunities for informed policy dialogue and training; support to global and regional knowledge networks and programs; training through face-to-face and distance learning methods; courses on water policy topics in partnership with leading institutions; and access to cutting-edge information on global experiences. This learning agenda will be implemented through a strategic approach, making extensive use of new technologies such as the Bank's expanding Global Distance Learning Network, and strategic institutional partnerships.

A.5.

Conceptual Framework of STEM	
1.	Sharing/transfer of knowledge, expertise, time and talents. Areas of the world with the fewest problems have the best man-power and the areas of most problems have the least manpower. Therefore a sharing of "water wealth" and expertise is essential. Increasingly people want to share what they have with those less comfortable.
2.	Education. The first step is to educate individual Governments about the need for action. The second is to educate NGOs like Oxfam, Tear Fund, etc. about water problems. The third step is to educate school children about water. (In this respect, a good idea might be to make a video describing water problems world-wide and send a copy to every school in Europe). The fourth step is Interuniversity partnerships for post-graduate education such as the IAHR European Graduate School of Hydraulics. The other education step to be taken is to approach the general public/society.
3.	Media. News media should advertise the aims of world water vision. Also the media of communication such as the Web which has completely revolutionised the information exchange should be relied on more widely.

education !

— ? IHE ?

A.6.

GOUTTE of Water, a Global Organization of Universities for Teaching and Training and Ethics of Water.

As education is the key to achieve sustainability, investment in education and university networks is thus a direct investment into our future and peace.

GOUTTE of Water is conceived as a global water-oriented, umbrella organization of universities and other educational networks, active in Teaching and Training, thus contributing to enhance "Water Wisdom". Furthermore they are willing to shape a "New Water Ethics" in academia and in future practice. The same time GOUTTE of Water is engaged in the Transfer of Teaching Experience. While focusing on the principle of subsidiarity, it is expected to combine both parity-based and assistance oriented partnerships.

Networking would avoid duplication and would save budget without leading to uniformity and academic stagnation. It may offer joint educational programmes and modules no one ever dreamed to develop alone.

It would be most effective at university and postgraduate degree programme level, and would be a forum where collaborating entities and their programmes can be discussed, compared and concerted.

It will not be limited on education and training alone. Research should be part of its scope.

GOUTTE of Water could at later stages take over tasks like advisory function in accreditation, degree comparison, programmes reviews and quality assessment on behalf of national governments, international organizations and its own partners.

The global network would be based on cells combining partners from developing and developed universities. Cells are expected to be focused on common interest or interdisciplinary context and are formed to use one common language of communication while the global network might rely on several cells using different languages.

Finally , this global water oriented inter-university partnerships appears to be the best way to utilize available human and material resources to face and to prevent the predicted water crisis expected to occur in the coming decades.

(The concept GOUTTE of Water was first presented at the International Symposium "The Learning Society and the Water Environment", 2-4 June 1999, Paris)

GOUTTE of Water
A Global Organization of Universities for Teaching Training and Ethics of Water
(for Transfer of Teaching Experience)

GOUTTE of Water
(the concept)

Is a large global, **water oriented umbrella organization** of universities and other educational networks

Combines **parity based** and **assistance oriented** partnerships

Is a **forum** for **collaboration co-ordination** and **co-operation** between participating entities

Is **based on cells**, combining partners from developing and developed universities, focusing on **common interests** or / and **interdisciplinary context**

GOUTTE of Water
(the academic features)

Is active in **teaching and training** educators and those to be educated

Is willing to contribute in shaping a **"New Water Ethics"**

Enhances **research and research education**

Could take over **other tasks** at a later stage

Should remain **flexible** to carry out its mandate

GOUTTE of Water
(the justification)

Interuniversity networking
is a **promising way to sustain** the well-financed but short lived **academic exchange programmes**

Stimulates research

Does not lead to uniformity nor to academic stagnation

Avoids duplication

Does not eliminate competition

GOUTTE of Water
(the organizational features)

Works as a **follow-up organisation** where geographical limited partnerships can continue and extend their activities

Should be a **self-governing network**

INVESTMENT IN EDUCATION IS A DIRECT INVESTMENT IN OUR FUTURE AND PEACE

B. Networks and Partnerships, Educational Projects

B.1.

The DWAF/UNESCO/WMO Mission on the Assessment of the Education and Training Needs of the Water Resources Management Services of the Republic of South Africa

As the world is moving towards an ever more knowledge- and skill-based society, South Africa's new water policies must be supported by a thorough understanding and analysis of the education and training (E&T) needs of this sector.
The DWAF/UNESCO/WMO mission formulated a strategy to assess and to address education and training needs of the water resources management services of the Republic of South Africa.

This strategy suggests to establish immediately a co-operative networking among E&T providers, employers and employees in the public and private sector, and to include also NGOs and donor agencies. It must capitalise on existing E&T activities, but should also advance/promote a new generation of activities. It proposes to create a Framework Programme for Education and Training for Water (FET-Water), a flexible structure with well-defined mechanisms for actions to fulfil the proposed strategy. FET-Water is to be created with a management committee, streamlined management structure within an existing independent organization which guarantees viable long-term financing, subject to review every four years.
It is foreseen that the implementation of FET-Water will close the triangle of excellence: POLICY-RESEARCH-EDUCATION. It will also make provision for receiving E&T need statements from employers and societies.
The strategy aims to construct gradually an open and dynamic area for a broad range of learning opportunities in the water and environment sector of South-Africa and the SADC countries.

B.2.

International Network for Capacity Building on Integrated Water Resources Management (CAPNET)

The purpose of CAPNET is to foster human resources development for integrated water resources management (IWRM) through the strengthening of individual and, through them, institutional capacities in a number of countries and regions. CAPNET's objectives will be achieved through networking, awareness creation, training and education, and development of relevant materials/tools. As an associated programme of the Global Water Partnership (GWP), CAPNET will serve as a global network which operates as a support programme for regional and national networks of IWRM training and education institutions, which will, in the end, deliver the actual capacity building. Although UNDP and the Netherlands are the initial sponsors of CAPNET, other multilateral, bilateral, non-governmental and private sector organizations are encouraged to join this multi-country, multi-donor undertaking.

B.3.

WaterNet, a new Initiative in the SADC Region

WaterNet is an initiative to establish a regional network for education, training and research on integrated water resources management in Southern Africa. The network will consist of a number of participating institutions, including the relevant universities and training institutes in the region, and the relevant major stakeholders (water authorities, water companies and water industry). An inventory has shown a large regional training need and a keen interest from stakeholders in the region to set up such network.
WaterNet will consist of modular MSc courses in the field of IWRM, distributed over the participating institutions with exchange of modules, lecturers and students; training courses at different nodes in the region; the WaterNet fund to facilitate regional research and the WaterNet Association, a society for water research.
WaterNet will play an important role in "leveling the playing field", which implies that less well-endowed riparians need to be strengthened to improve their negotiating position and hence opportunities for agreements to be reached. WaterNet will be linked to CAPNET and may be a possible model. Financial support to WaterNet is being provided by the Netherlands and Sida.

B.4.

GEF

Strengthening Capacity for Global Knowledge Sharing in International Waters

The purpose of this global project is to improve global management of transboundary water systems by increasing capacity to replicate best practices and lessons learned in each of the GEF supported international waters operational programmes. Phase I integrates three initiatives.

Dist. Learn.

1. The International Waters Distance Learning Project (IW:LEARN) which uses new communications technologies for an "international waters knowledge community" so that people managing these ecosystems can better teach and learn from each other.
2. The TRAIN-SEA-COAST project (TSC) will establish six new regional centers for course development guided by a participatory needs and resources assessment. IW:LEARN will cooperate with TSC in targeting new areas for the development of TSC curricular materials and identify selected TSC courses/modules which can be converted into distance learning formats.
3. The biennial GEF International Waters meetings will be arranged for a portfolio-wide strategic planning and exchange of project experience and lessons learned.

The experience and methodologies developed under this project will be made available to CAPNET for learning purposes.

B.5.

Water-Related TEMPUS – Joint European Programmes (JEPs)
Overview of European Networks

(sampled from the Subdepartment of
Water Resources, Wagenigen University,The Netherlands)

1. TEMPUS No. 266 (1990-1993)
   Title: Environmentally sound river basin development
   Objective: Co-operation on methods of sustainable, environmentally sound river basin administration
2. TEMPUS EWA-Ring No. 2150 (1991-1994)
   Title: Interuniversity coordinating forum for (East-West) cooperation in the area of environment, water and agricultural soils (EWA-Ring)
   Objective: Creation of a interdisciplinary partnership of 25 universities from 10 countries. Forum for an implementation of joint educational, training and mobility programme through student and staff mobilities between West → East, East → West, East → East and short intensive courses.
3. TEMPUS ECEE No. 4988 (1992-1995)
   Title: European Cooperation for Environmental Education (ECEE)
   Objective: Improvement of university education on environmental protection through updating curricula and teaching material in Central Europe.
4. TEMPUS SWARP, No. 7862 (1994-1997)
   Title: Joint Curricula Development for Soil and Water Resources Protection (SWARP)
   Objective: Restructure the curricula at 8 Polish universities including the creation of a 4-year Ph.D course at Warsaw Agricultural University and a postgraduate course at the Agricultural University of Wroclaw, both in the area of Environmental Protection and finally to develop a Geographical Information Systems training Centre at the Warsaw Agricultural University.
5. TEMPUS ICER, No. 7924 (1994-1997)
   Title: International Cooperation for Educational Restructuring (ICER)
   Objective: To incorporate environmental/ecological concepts in Civil and Agricultural Engineering courses at 8 Hungarian universities and institutions of higher education; to set up new PhD programmes in Environmental Engineering and Integrated Water Management. To organize international interdisciplinary PhD Workshops and hydrological field experiments.
6. TEMPUS PANSED, No. 9206 (1995-1998)
   Title: Polish Agricultural Universities Network for Sustainable Environmental Development
   Objective: Creation of an new inter-faculty didactic institution at the Warsaw Agricultural University in order to provide education in the field of 'Environmental Modelling and Impact Assessment', and the restructuring of the Agricultural Engineering and Civil Engineering study programmes, more specifically in the area of Sustainable Environmental Development, by including new topics dealing with 'Water and Agricultural Soils'.
7. TEMPUS DATE, No. 9240 (1995-1998)
   Title: Specialization in Soil Science and Land Use Teaching
   Objective: Development of 2 new subject areas (Land Use - Management and Soil Science) and introduction of these subjects in the PhD programme at four Hungarian universities with new educational methods (GIS, CAD, multimedia) and updated textbooks. Development of joint curricula leading to mutual recognition of periods of study and double degrees. Creation of a new educational centre at Debrecen Agricultural University.
8. TEMPUS STEEM, No. JEP11463 (1996-1999)
   Title: Interdisciplinary Study Programme in Environmental Engineering and Management
   Objective: Introduction of new degree courses, at both Bachelor and Master levels, at the two Polish partner universities: an interdisciplinary and inter-faculty study programme in 'Environmental Engineering and Management' at the Warsaw Agricultural University

B.6.

European Thematic Network
ETNET 21

"Research and education always go together"

ETNET 21, the European Thematic Network of Education and Training for ENVIRONMENT-WATER, will focus on the relation between research and technological development (RTD) in the domain of environment-water as producers of knowledge and skills, and the learning processes, methods and tools to enhance the transfer of this new knowledge and skills into the higher education system, including continuing education, training and professional development systems.
ETNET 21 will identify what are the research priorities and how to transfer the results to those who can apply them in order to meet the society's requirements and concerns.
It will build upon existing networks, bridge the gap between researchers and educators, create synergies between these two professional communities in the environment-water field and bring the many stakeholders together in this broad multidisciplinary field.

B.7.

WET

International Project WET (Water Education for Teachers)
"Water Education Materials, Training Courses, Network, and Support Services"

Project WET is an international, interdisciplinary, water science and education program for formal and non-formal educators of kindergarten through grade twelve students. Project WET is a source of information and materials, professional development training courses, networking assistance, and a valuable resource for organizations that have questions about water education and creating their own education initiatives. Since the inception of Project WET in 1984, the program has attracted global interest. The goal of the Project WET program is to facilitate and promote the awareness, appreciation, knowledge, and stewardship of water resources through the development and dissemination of classroom ready teaching aides and the establishment of state and internationally sponsored Project WET programs. The need for Project WET is derived from both educators and water managers. Educators need materials that are relevant, hands-on, and engaging for students. Water policy makers, managers, and scientists have a critical need for public understanding of and involvement in water issues. Project WET can meet the needs of both groups. Project WET is part of a larger water resources education program called The Watercourse. The Watercourse has fifteen water education project divisions covering a range of priority water management topics such as wetlands, watersheds, ground water, water quality and public health, conservation, drought, flooding, and environmental protection. Core program materials like the *Conserve Water Reference and Activity Guide, Wonders of Wetlands Guide* or the highly acclaimed *Project WET Curriculum and Activity Guide* contain a wealth of information on water that is scientifically sound and educationally appropriate for reaching young people. Introductory and advanced water education workshops and training courses are available to sponsoring organizations.

B.8.

GREEN-Belgium initiatives and partnerships				
Initiative	**Initiator/donor**	**Target groups**	**Features**	**Status**
Vivre avec la Meuse et Vivre avec l'Escaut To Live with the Maas and To Live with the Schelde	- GREEN-B - Centre régional d'Initiation à l' Environnement (CRIE) de Spa-Bérinzenne - Région Wallonne Direction Générale des Ressources Naturelles et de l' Environnement (DGRNE)	- Secondary schools: Teachers of every discipline and pupils (16-18 y.o.) - Technical secondary schools	- Actions and Research Watershed oriented - Partnership inside River Contracts (concerted and integrated WRM)	operational pilot project
Assises Européennes de la Jeunesse pour l'Eau (European Meeting of the Youth for Water) Le Parlement des Jeunes pour l'eau (Youth Parliament for Water)	- Solidarité Eau Europe (EUROPE WATER SOLIDARITY) - Environment Territory Development and local Authorities Commission of the Water Parliamentary Assembly of the European Council - GREEN-B - the River College - the city of Espalion	Every young people between 10 and 15 y.o. concerned by water in continental and pericontinental Europe	- Practice of democracy and citizenship - Intercultural exchanges - Solidarity	operational
les Classes d'eau Water Classes	- IRGT - GREEN-B - Belgian delegation of the Group of Lisbon - Belgium Water Supplier Association (Belgaqua)	Primary and secondary schools (10-18 y.o.) Technical secondary schools	- Practice of democracy and citizenship - Watershed oriented Methodology of water diagnostic	Conception

C.

AWARDS

International recognition is an efficient way to honor extraordinary services. Though the regular award of prestigious prizes the work rendered for WET could be given a higher appreciation. The Water World knows a number of well-esteemed prizes like the Stockholm Water Prize, including its Junior version, the International Hydrology Prize of IHAS, WMO and UNESCO, the recently created Grand Prix de la Ville de Cannes, associated with the Réseau Méditerranéen de l'Eau (The first Water-related UNITWIN Network based on UNESCO Water Chairs) etc. specifically W-E-T oriented prizes or specific cycles, when existing prizes are awarded explicitly for W-E-T activities should be considered.

5.3. Outlook

While recently water issues are given ample consideration at the political level (UN General Assembly, CSD, Conference on Water and Sustainable Development, Paris, March 1998, etc.) there is a trend of diminishing funding for water research, education and training. In this context the W-E-T Vision can be seen as an attempt of the W-E-T World to counteract this tendency.

Nevertheless the W-E-T Vision aims much more. It should be the expression of the conscience of the "W-E-T World", a rallying point to have its reference function well beyond the "active", elaboration phase of the World Water Vision. The present Framework Paper is a milestone along this way, towards a comprehensive vision on W-E-T.

Without saying it explicitly the W-E-T Vision opts for the SWW Scenario as the vision worth to work for. It implicitly acknowledges that the world can not afford WAC or similar scenarios to become reality. E&T is the basis for sustainability, but once the dynamic balance of development would tip, the manifold feedbacks of WAC to the "W-E-T World" would paralyse the later one, thus ripping off its ability to help reverse the trend. Instead, a vicious downward spiral could be triggered with less funding, less infrastructure, less teachers and trainers and less people to be educated, while the population growth may even increases. In this WAC-like scenarios stabilization would only be reached at an almost unimaginable low level, entirely unattractive for human aspirations.

The sustainable "W-E-T World" is thus synonymous with SWW. We are all challenged, educators and those to be educated, to make this happen.

ANNEX 1

ACRONYMS and ABBREVATIONS

ADB	African Development Bank
AsDB	Asian Development Bank
ASEAN	Association of South-East Asian Nations
CAL	Computer-Aided Learning
CC	Collaborative Cluster
CET	Continuing Education and Training
CIDA	Canadian International Development Agency
CSD	UN Commission on Sustainable Development
CPD	Continuing Professional Development
CWW	Conventional Water World
EBRD	European Bank for Reconstruction and Development
ESA	External Support Agencies
E&T	Education and Training
ETNET Environment-Water	European Thematic Network of Education and Training
FAO	Food and Agricultural Organization
GEF	Global Environmental Facility
GOUTTE of Water	Global Organization of Universities for Teaching, Training and Ethics (Transfer of Teaching Experience) of Water
GREEN	Global Rivers Environmental Education Network
GTZ	Gesellschaft fuer Technische Zusammenarbeit (German Company for Technical Co-operation)
GWP	Global Water Partnership
HRD	Human Resources Development
HWRP	Hydrology and Water Resources Programme (of WMO)
IAHR	International Association of Hydraulic Engineering and Research
IAHS	International Association of Hydrological Science
IGO	Intergovernmental Organization
IHD	International Hydrological Decade (of UNESCO)
IHE	International Institute for Infrastructure, Hydraulic and Environmental Engineering, Delft, The Netherlands

IHP	International Hydrological Programme (of UNESCO)
IWRA	International Water Resources Association
IWRM	Integrated Water Resource Management
NEDA	Netherlands Development Agency
NGO	Non-Governmental Organization
OIE	Office International de l'Eau
PA	Public Awareness (raising)
QF	Quality First
R+E	Research and Education
SID	Society for International Development
SIDA	Swedish International Development Agency
STEM	Sharing/Transfer/Education/Media
SWW	Sustainable Water World
TAC	Technical Advisory Committee (of the GWP)
TECHWARE	Technology for Water Resources
UN	United Nations
UNDESA	United Nations Department on Environment and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Funds
UNITWIN	University Twinning (UNESCO Interuniversity Network created by UNESCO Chairs)
WAC	Water Crisis Scenario
WBI	World Bank Institute
WEDC	Water, Engineering and Development Center, Loughborough University, United Kingdom
W-E-T	Water-Education-Training
WET	Water Education for Teachers
WHO	World Health Organization
WMO	World Meteorological Organization
WWC	World Water Council

ANNEX 2

GLOSSARY

This section attempts to introduce and to describe briefly the most important terms and conceptual elements of the present report. It relies on respective literature (Gilbrich, 1997, Bogardi et al, 1995, Delors et al, 1996, etc.) (UNDP Symposium, A Strategy for Water Sector Capacity Building, IHE, Delft, 1991) and accepted terminology in the area of water-related education and training. This annex is, however, not a complete glossary, as it does not contain all possible entries, but confines itself to the elements relevant in the context of the W-E-T Vision.

GENERAL CONCEPTS AND TERMS

Bottom-Up Approach: describes proposed or implemented actions conceived, initiated and executed by those groups which are most affected by the respective action (beneficiaries, service providers, etc.) These "grass roots" initiatives usually need "top-down" encouragement, acceptance and funding to develop their full potential.

Business Enterprise Sector: includes all firms, organizations and institutions whose primary activity is the production of goods or services for sale to the public. Private, non-profit institutes mainly serving them are also included.

Capacity Building: consists of three basic elements:

- creating an enabling environment with appropriate policy and legal frameworks
- institutional development, including community participation
- human resources development and strengthening managerial systems

Environmental Awareness: describes the process and product of the sensitization of concerned citizens, the affected public, the individual professionals and professional, educational and administrative organizations with regard to environmental issues. Environmental awareness can thus be interpreted as (part of) public awareness, but it covers also a professional attitude (to be strengthened) towards a more conscious approach towards resource development and management. In this regard (institutional and professional) environmental awareness is a pre-requisite of integrated water resources management. Towards the implementation of this concept in the daily practice of water affairs, the environmental awareness of educational institutions and concepts play a vital role.

Government Sector: is composed of all Ministries, departments, offices and other bodies which furnish, but normally do not sell to the community, those common services which cannot otherwise be conveniently and economically provided, and administer the state and the economic and social policy of the community.

Higher Education or Tertiary Sector: is comprised of all universities, colleges of technology, and other institutes of post-secondary education, whatever their source of finance or legal status. It also includes all research institutes, experimental stations etc. operating under the direct control of, administered by, or associated with, higher education establishments.

Human Resources Development (HRD): includes awareness-raising, education, training at all levels, research capacity building, information exchange, and involves employment practices, career structures and professional and financial incentives

Integrated Water Resources Management (IWRM): broad paradigm of the (new) philosophy of water resources management calling for a holistic approach. Integrated Water Resources Management (IWRM) is a process which aims to ensure the coordinated development and management of water, land and related resources to optimize economic and social welfare without compromising the sustainability of environmental systems
In the broadest sense IWRM means the simultaneous considerations of water quantity and quality aspects of both surface and groundwater resources embedded into a systems analytical approach with reference to other sectoral activities such as industries, aquaculture or agriculture, public health, environmental protection, etc. IWRM needs inter- and multidisciplinary approaches and public participation, public awareness raising etc. Elements of integrated water resources management
The GWP/TAC has identified the following nine IWRM elements: water sector assessments, water policy and strategy, water legislation and standards, institutional framework, participatory planning and management, allocation across (sub)sectors & conflict resolution, functions and values of water resources, trans-boundary issues, and linkages between land, water and ecosystems. There is an obvious education and training need to "produce" the experts who will be able to implement IWRM in practice.

Public Awareness: describes the process and the product of the sensitization of concerned citizens and the affected public and their "grass root" representation of the different issues related to the consequences of (water resources) development, management, strategies etc. Public awareness reflects the (expected) response of individuals, irrespective of the nature of the issue (political, economic, ecological, etc.)

Stakeholder: the general term to describe an agency, interest group, company, individuals, water users, bulk water suppliers and communities or representations thereof, taking part in IWRM or in the related participatory process.

Sustainable Development: a much-used term of the recent years, having many definitions. In the broader sense it is described as (actions towards) the fulfillment of the aspirations of the present generation without jeopardizing the future generations to achieve their own (perceived) objective.

Sustainability: generalised concept of the previous entry, describing the perception of a state or an action to have lasting effects (usually benefits). While it is seldom found, sustainability should be associated with an (estimated) time scale, to be used as a true quantified indicator.

Top-Down Approach: describes proposed or implemented actions conceived, initiated and executed following legislative or executive orders (hierarchical approach).

EDUCATIONAL AND TRAINING CONCEPTS AND TERMS

Accreditation: is the recognition of an educational institution as maintaining standards that qualify the graduates for admission to higher or more specialised institutions or for professional practice.

Certificate (of Attendance): document issued by an organiser of an educational or training event (usually CET), attesting the participation and eventual successful completion of the respective programme. In contrast to degrees and diplomas, certificates are not recognised as professional qualification and are usually ineffective to foster career prospects.

Competency: specified knowledge and skill to fulfill a given job.

Continuing (professional) Education and Training (CET): any formal or informal education and/or training activity conceived for recipients who possess an accredited vocational, professional or academic qualification in the respective or related field.

Continuing Professional Development (CPD): CET activities in a specified profession.

Curriculum: is the totality of an organised learning experience; it provides the conceptual structure and sets the time frame to acquire a recognisable degree, and describes its overall content, e.g. the curriculum of a five-year degree programme in "Mechanical Engineering" at a certain higher education institution; the curriculum is the choice of the student out of the programme which is the totality of what the University offers. The programme is usually identical to the university catalogue. In some cases programme and curriculum are identical because the training institution offers only one curriculum which constitutes its programme, e.g. one specialised training course. A course is the totality of an organised learning experience in a specific area, e.g. the course on "Fluid Dynamics" within the curriculum "Mechanical Engineering"; courses may consist of course units to form a totality.

Degree, Diploma: nationally recognised documents of professional and academic qualification issued by an accredited institution or ministry.

Donor: in the sense of education and training (E&T) an individual or organization providing means (in cash and/or kind) to support E&T activities without being involved in the implementation otherwise.

Education: formal and informal processes being associated with the transfer of knowledge to an individual. Any action leading to increasing one's knowledge.

Formal Education and Training: E&T which is carried out by accredited private or public institutions (schools, universities, colleges, vocational training centers, etc.). Traditionally formal education relies on classroom teaching, tutorials, examinations, etc. along a fixed curriculum. Formal education and training, once successfully absolved, leads to acknowledged vocational and/or academic qualifications (diploma, academic degree, etc.).

Informal Education and Training: describes E&T activities conceived to respond to imminent or latent needs, focusing more on the transfer of necessary knowledge and skills than their normal accreditation. Informal education (and training) relies traditionally on on-the-job training, self-study, mentoring in-house CET activities, etc.

Knowledge: is the ability in understanding and rational, scientific and strategic thinking. It is a universal and time independent ability that fulfills the puzzle-solving mind of mankind and allows the individual to adapt more easily to a changing environment.

Learning Society: a paradigm with various definitions, describing the broad social acceptance that the principle of lifelong learning should penetrate all walks of life. In a more focused sense, "learning society" implies that companies, industries (the economic world), incorporate learning (CET) into their regular activity programme, thus abolishing the "pejorative" duality of productive work and CET. In more philosophical terms, "learning society" assumes a general desire to raise everybody's educational level and a general proactive attitude. In the ideal case, the whole society participates in this learning process and not only (the upper) part of it.

Lifelong Learning: a recently emerging concept acknowledging the increasing pace of knowledge renewal and additional skills to be acquired, thus rendering one's professional life to become a continuous process of formal and informal education, training (CET) and eventually retraining.

Post-Graduate Education and Training: in some publications this is equated to all types of educational activities following the first (professional, academic) degree. Thus M.Sc. and Ph.D. programmes are considered together with CET activities leading to certificates of attendance. In the context of this report the term "post-graduate education" is used with reference to additional degree programmes only.

Recipient (beneficiary): in the sense of E&T, individuals, groups and organizations being the subject of E&T activities. Those knowledge and skills are expected to increase as a consequence of E&T measures.

Retraining: concentrated formal process (including informal CET elements) enabling an individual to continue vocational and professional activities in a different (disciplinary) field other than the one determined by his/her primary qualification.

School: formal educational institution providing services at primary and secondary level. Graduates of the secondary school level are usually qualified to enter the academic or higher professional educational institutions and programmes. Schools (secondary level) may adopt professionally orientated curricula, thus providing specialized, skill-orientated knowledge.

Service provider: in the sense of E&T, institutions (universities, schools, training centers or other organizations) and individuals actively involved in the planning and implementation of E&T.

Skill: is the ability in mental and/or physical performance. It is generally a local and time dependent characteristic and strongly linked to the so-called technologies available in a given environment. It fulfills the problem solving-mind of mankind and is essential for the individual to operate efficiently in a given society.

Syllabus: is the prescription of details on a specific course, such as what will be learned (and when), the texts to be read, the areas in which expertise is expected to be demonstrated. It may contain descriptions of methods of teaching and assessment to be used.

Train-the-Trainers: educational and training concept describing the effort to transfer the necessary knowledge and skills to individual(s), enabling them to transfer special abilities, information, knowledge and awareness to certain target groups. Along these lines "trainers" are usually trained to deal with marginalised groups, rural communities or other groups usually cut off from regular educational and training programmes due to geographical distances, language barriers, educational disadvantages, etc.

Training: formal and informal process being associated with the transfer of abilities and skills to an individual. Any action leading to increasing one's skills.

Training Centre: educational and training institution focusing on (usually non-degree) CET activities for vocational and professional training and retraining. Training centres may operate as independent educational entities or as part of an enterprise or agency.

University: formal educational institution of higher learning providing services at academic (scientific) level. The central mandate of universities is to provide academic degree(s)-orientated educational programmes, relying on the interaction of research and teaching. Traditionally, university programmes are discipline-orientated. At higher academic levels there are many promising interdisciplinary initiatives. Universities usually provide educational programmes at different levels:

- undergraduate: B.Sc., B.Eng., BA
- graduate honours class degree
- Master of Science, Master of Engineering
- research degree Ph.D. (doctorate)

In a modern learning society universities are expected to increase their outreach activities by providing consulting services, CET, etc.

W-E-T World: in context of the present W-E-T Vision this term is used to describe the entity of those persons, agencies and educational and training institutions which (who) are directly involved in water-related research, education and training.