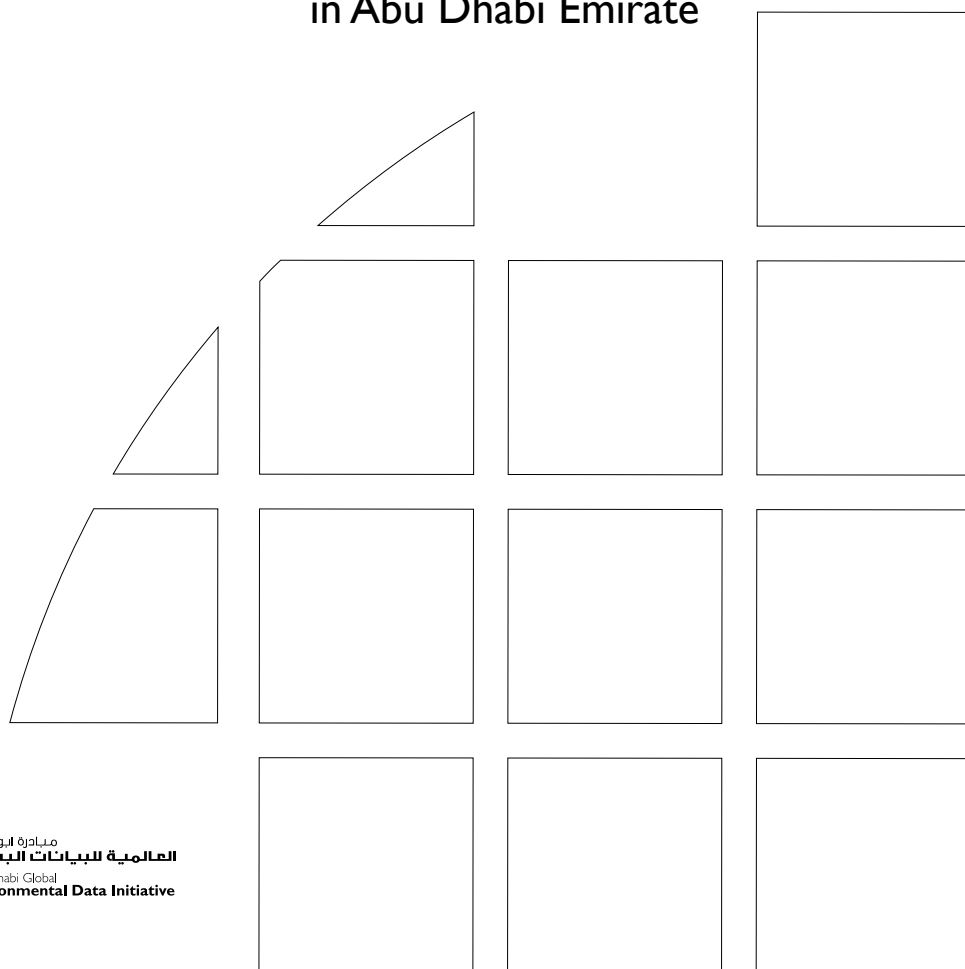


Environment Education

in Abu Dhabi Emirate



Environment Education

in Abu Dhabi Emirate





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- بشكل عام، تم إعداد الأوراق القطاعية الأصلية بشكل جديد قدم فيها مجموعة قيمة من المعلومات
- لم تصل مشاركة الشركاء والجهات المعنية إلى الحد المخطط له
- تم إعداد الأوراق القطاعية بدون دعم كافٍ من الهيئة أو الشركاء والجهات المعنية، وبالتالي، كان على مؤلف الورقة القطاعية تحمل عبء إعداد ورقة هذا القطاع في وقت زمني محدود نوعاً ما

- في بعض الحالات كانت البيانات المستخدمة قديمة نسبياً
 - لم يتم إضفاء الطابع المؤسسي على عملية جمع البيانات وتبادلها
- تهدف مراجعة المبادرة في إطار المرحلة الثانية إلى معالجة هذه الثغرات، فضلاً عن غيرها من الثغرات التي تم تحديدها كجزء من الأوراق الأصلية. ولأن تنفيذ مهمة فرق العمل تم كجزء من المرحلة الثانية من البرنامج، فقد تم تقديم الدعم على جميع المستويات لمساعدة موظفي هيئة البيئة - أبوظبي والشركاء والجهات المعنية على معالجة وتحديد الثغرات، وجمع البيانات وإجراء التحليلات وتطوير مخرجات البيانات المكانية، وبناء العلاقات مع الشركاء والجهات المعنية، وفي نهاية المطاف، إعداد الورقة القطاعية وتنقيحها.

وتشكل الأوراق القطاعية مصدراً قيماً للمعلومات البيئية والاجتماعية والاقتصادية لأبوظبي وتم استخدامها لمراجعة وتنقيح تقرير حالة البيئة لإمارة أبوظبي فضلاً عن إعداد الأطلس البيئي لأبوظبي (النسختين المطبوعة والتفاعلية).

ولمزيد من المعلومات حول المبادرة أو للوصول لنسخة الكترونية من الأوراق القطاعية، يرجى زيارة الموقع الإلكتروني في www.agedi.ae.

- البيانات
- الأدوات والأساليب
- التوعية
- بناء القدرات
- السياسة

الأوراق القطاعية

خلال السنوات الماضية قامت مختلف القطاعات المعنية بشؤون البيئة بتجميع كم من المعلومات المتنوعة بعدة صور تصف ما هو معروف عن البيئة في إمارة أبوظبي ودولة الإمارات العربية المتحدة والخليج العربي. خلال المرحلة الأولى لمبادرة أبوظبي العالمية للبيانات البيئية، تم تنظيم سلسلة من ورش العمل في عام ٢٠٠٥ لجمع المعنيين من هذه المنظمات، لتحديد القطاعات ذات الصلة، ووضع إطار العمل لكل ورقة قطاعية، ومعالجة الاحتياجات الاجتماعية والاقتصادية والبيئية الرئيسية في إطار كل القضايا المتعلقة في القطاع. من خلال هذا الورش، تم إعداد ثماني ورقات لقطاعية ونشرها:

- التلوث وإدارة النفايات
- القوانين والسياسات البيئية
- الموارد المائية
- الجغرافيا الطبيعية لإمارة أبوظبي
- البيئة البحرية والساحلية
- التراث التاريخي والأثري والثقافي
- التطور الاقتصادي والسكاني
- التعليم والتوعية البيئية

وتم إعداد قطاع إضافي كجزء من البرنامج الأصلي، ومع ذلك، وسيتم نشرها للمرة الأولى كجزء من المرحلة الثانية:

- البيئات البرية وموارد الأرض

و لأن الأوراق القطاعية هي مجموعة من أفضل المعارف المتاحة المتعلقة بالقطاعات البيئية والاجتماعية-الاقتصادية الرئيسية وتمثل أساس كافة المخرجات التي سيتم إصدارها لاحقاً كجزء من المرحلة الثانية للمبادرة، تم مراجعة الأوراق القطاعية الأصلية. وتم خلال ورشة العمل الدولية التي عقدت في عام ٢٠٠٧ تحديد ما يلي:

ما هي مبادرة أبوظبي العالمية للبيانات البيئية ؟

تم إطلاق مبادرة أبوظبي العالمية للبيانات البيئية في الثاني من سبتمبر ٢٠٠٢ خلال مؤتمر القمة العالمي للتنمية المستدامة الذي عقد في مدينة جوهانسبرغ بجنوب إفريقيا من قبل دولة الإمارات العربية المتحدة، كمبادرة شراكة من الصنف الثاني، لتكون أداة مبتكرة لتنفيذ الأحكام المتعلقة بالبيئة والواردة في الفصل ٤٠ من جدول أعمال القرن ٢١ وفي الأهداف الإنمائية للألفية.

وفي أوائل عام ٢٠٠٧، نظمت بأبوظبي ورشة عمل دولية لاستعراض الانجازات التي حققها برنامج المبادرة ووضع خطة إستراتيجية لمدة خمس سنوات. وعلى هذا النحو، بدأت المرحلة الثانية من المبادرة في عام ٢٠٠٨ بناء على ما تم انجازه في المرحلة الأولى، في حين تم معالجة الفجوات التي تم تحديدها من خلال المعلومات التي وفرتها الجهات المعنية خلال ورشة العمل.

ولا تزال الرؤيا التي تعمل وفقها المبادرة في المرحلة الثانية هي "وضع وتنفيذ نماذج عملية يمكن تكرارها وتكييفها من أجل إنشاء هيكل أساسي للبيانات البيئية المكانية عالية الجودة، للمساهمة في توفير القاعدة العلمية لاتخاذ القرارات". وسيتم في المرحلة الثانية استخدام الدروس المستفادة لتحقيق نجاح أفضل في تنفيذ المبادرة في مرحلته الثانية.

وسيركز البرنامج الحالي على وضع سلسلة من المخرجات التي تتناول قضايا محددة في حين يتم تحقيق نتائج مؤسسية معينة، بما في ذلك:

١. توفير بيانات بيئية أكثر جودة
٢. تحديد الثغرات في البيانات والأدوات
٣. تنسيق أقوى وشراكات لتبادل البيانات
٤. أساليب وأدوات أفضل للمعلومات
٥. ربط الإستراتيجية والتشغيل بشكل أفضل
٦. تحسين البنية التحتية البشرية والتقنية
٧. مؤسسة أقوى بشكل عام

والمخرجات التي تم تحديدها في إطار عملية التنمية هي أمور مترابطة ومتعاقبة مع المخرجات الأولية لدعم المعلومات والتفاهات التي تصب في الأنشطة اللاحقة. وهي تشمل ما يلي :

- مراجعة الأوراق القطاعية وقاعدة المعرفة
- مراجعة وتنقيح تقرير حالة البيئة
- الأطلس البيئي التفاعلي
- تعزيز بوابة البيانات المكانية
- تحسين الموقع الإلكتروني
- مؤشر الأداء الحكومي لأبوظبي
- برامج وضع الإستراتيجية

ولضمان تحقيق نتائج إيجابية وتوفير الموارد التقنية الكافية للقيام بتطوير المخرجات، تم إنشاء مجموعة من فرق العمل بهدف تجميع الموارد لدعم فرق كل مخرج من المخرجات المبادرة. وتشمل هذه ما يلي :



What is AGEDI?



The Abu Dhabi Global Environmental Data Initiative (AGEDI) program was fashioned around the United Nations World Summit for Sustainable Development (WSSD) Type II Partnership, after 2002 as a tool to support the environmental provisions of Chapter 40 of Agenda 21 and the Millennium Development Goals.

In early 2007, an international workshop was conducted in Abu Dhabi to review the accomplishments of the AGEDI program and develop the next five-year strategic plan. As such, AGEDI Phase II began in 2008 building off of accomplishments of the initial phase, while addressing gaps identified through stakeholder input during the workshop.

The vision of AGEDI Phase II remains to be a “replaceable, networked, adaptive and working model for the development and use of high quality spatial environmental data by all users within the Emirate of Abu Dhabi that will support sustainable decision and policy making”. Phase II will use lessons learned to better guide the successful implementation of AGEDI in its second phase.

The focus of the current program is to develop a series of interrelated products that address specific issues while achieving certain institutional outcomes, including:

1. Improve the quality of existing environmental data
2. Identification of data gaps and priorities
3. Stronger coordination and data sharing partnerships
4. Better information methods and tools
5. Better links between strategy and operation
6. Improved human and technical infrastructure
7. Stronger organization overall

The specific products under development are interdependent and sequential, with early products yielding information and understandings that feed into subsequent activities. These include the following:

- Sector Paper Review and Knowledgebase
- SoE Review and Refinement
- Environmental Atlas
- Interactive Environmental Atlas
- Geospatial Portal Enhancement
- Website Refinement
- EPI for Abu Dhabi
- Programs Alignment Strategy

To ensure positive outcomes and adequate technical

resources for carrying out the product development, a series of task forces were established as pooled resources to support each product team. These include:

- Data
- Tools and Methods
- Outreach
- Capacity Building
- Policy

Sector Papers

Over the years, different organizations compiled a variety of information in many forms that describe what is known about Abu Dhabi, the UAE and the Arabian Gulf Region. Through the initial AGEDI phase, a series of workshops were developed in 2005 to bring together stakeholders from all these organizations, identify the sectors that were relevant, design a framework for each Sector Paper, and address the key environmental and socioeconomic issues relevant under each sector. Through this effort, eight Sector Papers were completed and published:

- Waste Management and Pollution
- Environmental Policy and Regulation
- Water Resources
- Physical Geography
- Marine and Coastal Environment
- Paleontological and Archaeological Resources
- Population, Development and Economy
- Environmental Education and Awareness

One additional sector was scoped as part of the original program, however, and will be published for its first time as part of AGEDI Phase II:

- Terrestrial Environment

Because the Sector Papers are a collection of the best available knowledge pertaining to key environmental and socioeconomic sectors and they serve as the basis for all subsequent products to be developed as part of AGEDI Phase II, a review of the original Sector Papers was conducted. What was already known through the international workshop held in 2007:

- Overall, the original papers were done well and provided a wealth of information
- Stakeholder participation did not reach the level originally intended
- Sector Papers were developed without much agency or stakeholder support, and therefore, became the burden of the Sector Paper authors under a fairly limited timeframe
- Outdated data was used in some cases
- Data collection and sharing did not get institutionalized

The review under AGEDI Phase II sought to address these gaps, as well as the other gaps already identified as part of the original papers. Because the Task Forces were implemented as part of the Phase II program, support was provided at all levels to assist EAD staff and stakeholders in addressing and identifying gaps, collecting data, conducting analyses and developing spatial products, building stakeholder relationships, and ultimately, developing a refined Sector Paper.

The Sector Papers are a source of valuable environmental and socioeconomic information for Abu Dhabi and were used to review and refine the State of the Environment (SoE) report for Abu Dhabi, as well as develop the Abu Dhabi Environmental Atlas (both hard-copy and interactive versions).

For more information and online versions

Additional information and online versions, please visit the AGEDI website at www.agedi.ae

EXECUTIVE SUMMARY



Traditional society in Abu Dhabi Emirate was environmentally conservative. Today with fast pace of urbanization and development lack of sound environmental education and awareness is often cited as one of the reasons for the Emirate's high waste per capita and high water and energy consumption. Education is also imperative for adapting to and helping to mitigate Climate Change. Given the fact that the Environment is non negotiable, the key to achieving environmental sustainability is through Education. It is an accepted fact that Education helps to shape behavior and environmental education is paramount to developing environmentally responsible citizens.

Environment education in the modern sense of the term started in the late '70s. Until almost early 2000, there were very few organizations promoting education and awareness. Currently, there are many more agencies, institutions and associations, in addition to some corporate sectors, disseminating environment education and awareness activities and programs in the emirate. The Abu Dhabi Environmental Strategy 2009-2013 emphasizes environmental awareness as a key priority area, however, due to the changing structure of the Environment Agency – Abu Dhabi, the main implementer so far in environment education issues has to now assume the role of a regulatory body. Thus is in a process of setting in place a mechanism wherein the Agency will become less of an implementer of environmental education programs and take on the onus of setting environment education and awareness policies, capacity building measures and establish and rely on more external parties for awareness dissemination.

With efforts provided by different disseminating agencies, environmental concerns among the public has definitely shown increase, which would not have been possible without the synergetic effort at awareness by the media. Despite considerable Environment Education (EE) initiatives, awards and accolades, many targets and issues yet remain unaddressed. Issues targeted so far include Water, Waste, Energy, Biodiversity, Climate Change and Pollution.

While Students were and still remain one of the most important target audiences to be addressed, unlike in the past, much more efforts have now been made to target the general public. There is also scope to enhance outreach to be conducted with special target groups such as farmers, women, fishermen, the corporate sector and industrial employees. According to the survey conducted to assess the level of awareness achieved among the public in Abu Dhabi Emirate, 48.9% of the people are aware about prioritized environmental issues such as waste, water, biodiversity, pollution and global issues.

The percentage level of behavior was 43.8 suggesting that there was a disconnect between awareness and behavior. Water issues had the lowest levels of awareness whereas energy issues had higher levels with all other issues ranging in between. In all issues, however, the level of behavior was low. Among the influencer sample surveyed, teachers were most knowledgeable whereas media was quoted by all as the major source of information on awareness. Important recommendations from target groups surveyed includes the need for more practical guidelines, a stronger role of positive influencers, strict implementation of laws and regulation, in addition to incentives for good behavior. There is an urgent need for leap frogging environmental education efforts to promote responsible behavior for achieving sustainable development. To meet the higher international benchmarking levels of environmental awareness, EAD has now revised its strategy and methodology for effective environment education dissemination.

Challenges to effective dissemination of Environmental Education and Awareness include:

- Achieving economies of scale in managing issues and targets
- Fostering cooperation between environmental agencies and other agencies to promote better performance while encouraging involvement of existing NGOs to increase outreach and implementation
- Provide networking opportunities and build capacity to encourage focus groups and volunteer forums to take on implementation of environment education and awareness
- Establish and expand institutional and infrastructural framework for effective dissemination
- Reorienting themes, programs, processes, issues and targets to address Sustainable Development (SD) issues and to move from EE to ESD (Education for Sustainable Development)
- Need to build capacity within the necessary cadre to make EE more effective and long-term

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1 BRIEF HISTORY AND DEVELOPMENT OF ENVIRONMENTAL EDUCATION



Internationally, it is claimed (Disinger, 1983) that the term 'environmental education' (EE) was first coined in 1948, by Thomas Pritchard at a meeting of the International Union for the Conservation of Nature and Natural Resources (IUCN). The 'classic' definition of the term was however provided by IUCN when they held a meeting in Nevada, USA in 1970.

'Environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture, and his biophysical surroundings. Environmental education also entails practice in decision-making and self-formulation of a code of behavior about issues concerning environmental quality' (IUCN, 1970).

The support of major international institutions raised the profile of environmental education during the 1970s. There was a common understanding of the aims, objectives and approaches to the subject. Principle 19 of the UN Conference on the Human Environment in 1972 declared:

'Education in environmental matters for the younger generation as well as adults... giving due consideration for the underprivileged is essential.'

UNEP together with UNESCO in 1975 founded the International Environmental Education Program (IEEP), which was launched in Belgrade and produced the first intergovernmental statement on environmental education. 'The Belgrade Charter' listed the aims, objectives, key concepts and guiding principles for environmental education.

i. to foster clear awareness of and concern about economic, social, political and ecological inter-dependence in urban and rural areas;

ii. to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment;

iii. to create new patterns of behaviour of individuals, groups and society as a whole towards the environment.

1.1 OBJECTIVES OF ENVIRONMENTAL EDUCATION

A key feature of the IEEP Program was that it planned to hold a follow-up conference with the involvement of politicians. It wanted its recommendations to be transformed into policy.

This came to fruition two years later in 1977 in Tbilisi, USSR. It was to be a milestone event in environmental education. This was the UNESCO first intergovernmental conference on environmental education, attended by 66 member states and numerous NGOs. The final report established a framework for international consensus, which has been the seminal influence on environmental education throughout the world. The Tbilisi Conference and its subsequent publications, provide a blueprint for the development of environmental education in many countries today.

The following is based upon the Tbilisi Report Recommendation 2 (1977):

Environmental Education:

- Is a life-long process
- Is inter-disciplinary and holistic in nature and application
- Is an approach to education as a whole, rather than a subject
- Concerns the inter-relationship and interconnectedness between human and natural systems
- Views the environment in its entirety including social, political, economic, technological, moral, aesthetic and spiritual aspects
- Recognizes that energy and material resources both present and limit possibilities
- Encourages participation in the learning experience;
- Emphasizes active responsibility
- Uses a broad range of teaching and learning techniques, with stress on practical activities and firsthand experience

- Is concerned with local to global dimensions and past/present/future dimensions
- Should be enhanced and supported by the organization and structure of the learning situation and institution as a whole
- Encourages the development of sensitivity, awareness, understanding, critical thinking and problem-solving skills
- Encourages the clarification of values and the development of values sensitive to the environment
- Concerned with building an environmental ethic.

The final report of the Tbilisi Conference reinforced the three main objectives set out by the Belgrade Charter and declared them as the three main goals of Environmental Education.

In 1980, the *World Conservation Strategy* also states that;

'Ultimately, the behavior of entire societies towards the biosphere must be transformed if the achievement of conservation objectives is to be assured... the long-term task of environmental education is to foster or reinforce attitudes and behavior compatible with a new ethic' (IUCN, 1980).

The 'Tbilisi Plus Ten' conference in 1987 was organized by UNESCO and UNEP and held in Moscow. Several major themes emerged from this conference, including the vital importance of environmental education:

'In the long-run, nothing significant will happen to reduce local and international threats to the environment unless widespread public awareness is aroused concerning the essential links between environmental quality and the continued satisfaction of human needs. Human action depends upon motivation, which depends upon widespread understanding. This is why we feel it is so important that everyone becomes environmentally conscious through proper environmental education' (UNESCO, 1987).

Our Common Future (WCED, 1987), widely known as the *Brundtland Report*, also, saw education as a major focal point:

'The changes in human attitude that we call for depend on a vast campaign of education, debate and public participation' (WCED, 1987).

With the Earth Summit at Rio in 1990 came the Agenda 21, covering a bewilderingly wide range of topics. Throughout, there are implications for environmental education, but the most significant are: Throughout, there are implications for environmental education, but the most significant are for educators, one of the most important outcomes of the conference is the recommendation that environment and development education should be incorporated as an essential part of learning, within both formal and non-formal education sectors.

- Chapter 25 - Children and Youth in Sustainable Development.
- Chapter 36 - Promoting Education, Public Awareness and Training.

Box 1.2 Agenda 21

Very clearly *Agenda 21* proposes that:

'Governments should strive to update or prepare strategies aimed at integrating environment and development as a cross-cutting issue into education at all levels within the next three years.' (Agenda 21, Chapter 36, UNCED 1992).

Because of all of these international initiatives, a broad consensus emerged on both the principles and objectives of environmental education. However, defining the content of environmental education is problematic. The environment is all-embracing and it must be considered in its totality. This can be considered strength or a weakness, depending upon point of view. The two extreme viewpoints are that environmental education can be taught throughout each subject, as an integral part of it, or, selected parts of it must be promoted for formal teaching.

It is generally accepted that environmental education has a threefold structure, that of education *about* the environment; education *from* the environment and education *for* the environment. These 'threads' are placed alongside the four elements

- empirical: concerned with observation, measurement and analysis;
- synoptic: concerned with the complex nature of the environment and its many complex interrelationships;
- aesthetic: many aspects of the environment are qualitative, rather than quantitative;
- ethical: the idea of personal responsibility for the environment and the concept of stewardship.

Box 1.3 Four elements of Environmental Education Curriculum

Of the curriculum:

Interwoven with these threads and elements are the dimensions of the learning process: knowledge and *understanding, skills and attitude*.

- The need to develop attitudes of care, curiosity and concern for the environment in such a way as to develop a sense of responsibility towards home, school and community;
- to demonstrate to children (or people in general) the complex interrelationships between humanity and the environment;
- to give pupils the necessary skills to do these things.

Box 1.4 Aims of Environmental Education

General aims for environmental education include: Department of Education and Science (DES, 1987).

1.2 CONCLUSIONS ON THE HISTORY AND DEVELOPMENT OF ENVIRONMENTAL EDUCATION

Environmental education in the UAE should be based upon the recommendations of the Tbilisi Conference (1977) and Agenda 21 (1992). These two milestone documents are a summary of world expertise, opinion, principles and good practice, concerning environmental education in the world today. Environmental education should consider ecological, political, economic, social,

aesthetic, religious and ethical aspects. It should provide experience of decision-making, problem solving and participation. The ultimate aim is for every citizen to have a responsible attitude towards the sustainable development of our planet Earth.

In order for these aims to be fulfilled, every educational establishment needs to carefully plan for environmental education. Guidelines should be developed at a Ministry level, but allowing for the utmost flexibility at ground level. Environmental education is a theme, composing of three, interlinked and tightly woven components: education *about* the environment; education *for* the environment and education *in or through* the environment. These components are interrelated and the planning process must fully take this into account

- Education about the environment develops the knowledge and understanding about values and attitudes.
- Education for the environment encourages people to explore their own relationship with the environment and complex environmental issues. It develops a caring and sustainable use and view of the environment
- Education in or through the environment uses the environment as an environmental resource for learning to take place. Development of knowledge and understanding give rise to skills of communication and investigation.

Box 1.5 Main components of Environmental Education

Any person responsible for planning the curriculum and associated learning tasks concerned with environmental education needs to take full account of all of the above-interrelated components.

1.3 THE FUTURE - THE MOVE TOWARDS EDUCATION FOR SUSTAINABLE DEVELOPMENT

The 2002 Johannesburg Summit was instrumental in broadening the vision of sustainable development and it re-affirmed the educational objectives of the Millennium Development Goals and the Education for All Dakar Framework for Action. The Summit proposed the Decade of Education for Sustainable Development and the United Nations General Assembly in its 57th Session in December 2002, proclaimed the Decade of Education for Sustainable Development for the period 2005 - 2014.

It was recognized that concerted action was needed to ensure that sustainable development offers a high quality of life for all, both for present and for future generations.

- respect for the dignity and human rights of all people and a commitment to social and economic justice for all;
- respect for the human rights of future generations and a commitment to intergenerational responsibility;
- respect and care for the greater community of life in all its diversity, which involves the protection and restoration of the Earth's ecosystems;
- respect for cultural diversity and a commitment to build both locally and globally a culture of tolerance, non-violence and peace.

Box 1.6 Qualities of ESD

The nations of the world, through the United Nations General Assembly, adopted the resolution to establish a Decade of Education for Sustainable Development. The reason they did so, was because they saw education as a *key tool*, leading to sustainable development. Whatever definition of sustainable development one favours, it is clear that the concepts of sustainable development are intricately linked to different models of social and economic development. Huge challenges revolve around who has access to, control over and use of natural resources. Human beings are central to all aspects of sustainable development and it is in the interests of all, for people to be educated in all aspects of its implementation. Education for Sustainable Development (ESD) promotes values, equity, justice and respect for all. It is these important qualities, which underpin strategies of sustainable development. The underlying values include: Education is an important part of all of these values and alongside spiritual motivations, is the best chance of promoting these values to the world.

Education has five key roles to play:

- education must inspire the belief that each of us has both the power and the responsibility to effect positive change on a global scale
- education is the primary agent of change towards sustainable development; it can transform their vision into reality
- education fosters the values, behaviour and lifestyles required for a sustainable future
- education for sustainable development is a process of learning how to make decisions that consider the long-term future of the equity, economy and ecology of all communities
- education builds capacity for future-oriented thinking

Box 1.7 Key role of education

Both informal and formal learning are important parts of ESD and all must lead to participation in seeking and implementing new patterns of change. Since 1945, the United Nations, through global dialogue has explored and evolved a core set of shared values. It is these shared values for all that ESD seeks to promote.

Environmental education is but a component of ESD. The latter sets the broader context for sustainable development to operate in. Because of its broad scope ESD must be fully integrated into other disciplines, it cannot be taught as just a subject.

- interdisciplinary and holistic;
- value-driven;
- exhibit critical thinking and problem solving;
- be multi-method;
- be participatory;
- be locally relevant.

Box 1.8 Major features of ESD

ESD should demonstrate the following features that exhibits three areas of perspective:

- socio-cultural perspectives, which include human rights; peace and human security; gender equality; cultural diversity and inter cultural understanding; health and governance;
- environmental perspectives, which include natural resources; climate change; rural; transformation sustainable urbanization and disaster prevention and mitigation;
- economic perspectives, which include poverty reduction; corporate responsibility and accountability and market economy.

ESD is for every person, and takes place at all stages of life and includes all possible areas of learning. It requires a re-orientation of education in order to focus on the development of the knowledge, skills, perspectives and values inherent in sustainability. Of course, ESD will be undermined if it is not available for all peoples. The content of the curricula will largely be derived from the local context, addressing issues which are both relevant and urgent. The on-going *Encyclopedia of Life Support Systems* (initiated in Abu Dhabi) will provide the necessary scientific body of knowledge.

It must be recognized that ESD takes place as much outside the classroom as in it. Specific attention will have to be paid to adult and community learning, youth-to-youth education initiatives and the increased role of Non Governmental Organizations (NGOs) in implementing ESD principles. Higher education has an important role to play in functioning as places of research and learning for sustainable development. The Global Higher Education for Sustainability Partnership (GHESP) provides a forum for co-operation and exchange of ideas and experiences.

1.4 THE DECADE OF EDUCATION FOR SUSTAINABLE DEVELOPMENT PURSUES A GLOBAL VISION:

The vision of education for sustainable development is a world where everyone has the opportunity to benefit from quality education and learn the values, behavior and lifestyles required for a sustainable future and for positive societal transformation.

The people become stakeholders when they accept, adopt or buy into a part of this vision, or when they are affected by it. UNESCO is the lead agency to provide a clear framework and to mobilize and direct action over the next ten years. Action in Abu Dhabi Emirate must closely follow this framework and guidelines and should strengthen its partnership with the premier organization.

The Environmental Agency, Abu Dhabi (EAD) should develop a strategy/operational plan, which seeks to enhance EE and promote ESD in the region. The following are all priority areas and worthy of greater attention:

- Professional development of teachers and all people involved in formal and non-formal educational activities
- Environmental audits and review within organizations, such as reduction of waste and reduction of carbon dioxide emissions
- An evaluation/monitoring program that will assess how effective the dissemination of ESD good practice is within the region
- Innovative approaches for implementing the Decade of Education for Sustainable Development within the region
- ESD partnerships that strongly feature sustainable development policy and practice. Partnerships in business and industry are particularly important
- Active engagement of all schools and higher education authorities with local authorities, businesses and NGOs involved in sustainable development practice
- ESD partnerships should focus on priority themes with in the region, dependent upon their interests and expertise
- Examples include (but should not be restricted to): energy needs/climate change, sustainable tourism; food and farming; biodiversity; water\needs; sustainable practice in urban environments
- Educational activities should address the social, environmental and economic dimensions of ESD
- ESD partnerships should focus on the concept of best utilization and conservation of natural resources

1948	IUCN Conference - Paris - first use of the term 'environmental education'.
1949	Founding of IUCN.
1965	First use of term 'Environmental Education' in UK.
1968	UNESCO Biosphere Conference - Paris.
1970	Founding of CEE (UK). IUCN meeting, Nevada, USA. Definition of Environmental Education.
1972	UN Conference on the Human Environment, Stockholm, Sweden.
1975	Founding of UNEP and IEEP. UNESCO/UNEP International Workshop on Environmental Education, Belgrade. The Belgrade Charter.
1977	UNESCO - First inter-governmental Conference on Environmental Education, Tbilisi, USSR.
1980	World Conservation Strategy (IUCN, UNEP, WWF).
1987	UNESCO/UNEP Educational Congress on Environmental Education and Training, Moscow.
European Year of the Environment.	
World Commission on Environment and Development - Our common Future - The Brundtland Report.	
1988	European Resolution on Environmental Education.
1990	Publication of National Curriculum Documentation for Environmental Education in England.
1991	Publication of <i>Caring for the Earth: A Strategy for Sustainable Living</i> (IUCN et al.).
1992	UN Conference on Environment and Development - 'The Earth Summit'.
1996	Publication of Government Strategy for Environmental Education in England.
Taken from: <i>Environmental Education in the 21st Century</i> , Palmer, 1998.	

Box 1.9 Development of ESD

2 HISTORY OF ENVIRONMENTAL EDUCATION AND AWARENESS IN THE ABU DHABI EMIRATE



Environmental awareness and education in the Abu Dhabi Emirate started with the formation of the Emirates Natural History Group in 1977, when visiting scientists came to the city to give a talk about dugongs to a group of expatriate residents. The founder of the group was the late JNB, fondly known as *Bish Brown*. He and his like-minded friends started the Natural History Group out of a common interest in the natural history and archaeology of the country. Knowledge about the birds, animals and flowers at that time was uncharted territory for the members. It is to be emphasized here, that the local inhabitants and the *Bedouins* knew quite a great deal about the fauna and flora, but nothing had been methodically recorded or scientifically studied.

Since its inception, the Emirates Natural History Group (ENHG) has contributed a great deal of information about the archaeology, fauna and flora of the UAE. Until very recently, this was in many cases the earliest (or only) data available.

It is to be noted that when the Emirates Natural History Group was founded, it was the only group in the country devoted to the study and protection of wildlife in all its forms, despite its amateur and voluntary basis.

The practical value of this sustained effort was vividly demonstrated during a pollution incident in Abu Dhabi's offshore waters during September 1993, when it was discovered that the only records available of stranding, and deaths of marine mammals were the few records held by the ENHG.

In terms of environment awareness and education, it can be said that the ENHG initiated interest among its members to know more about the natural environment of the emirate, and revealed, although indirectly, the status of many of the species and habitats in the emirate which were, and still are, facing problems. The group regularly communicated this to its members, through their fortnightly meetings and the presentations of their findings. With increasing interest and knowledge about the biodiversity and the natural environment in the emirate, the group also brought in many experts to their meetings in their quest to know more. The group also reached out to the government and the decision makers and communicated their findings to them. This was perhaps the first step in the emirate with respect to environment awareness and communication. This initiative was encouraged by the patronage of Sheikh Nahyan bin Mubarak bin Al Nahyan.

To date, the group seeks to inform, educate, lobby, record and publish information on all aspects of natural history in the UAE. It aims to provide a forum whereby both expatriate and national residents of the emirates avail of the opportunity to enjoy the pleasure of learning about the country in which they live through meetings and trips.

It is to be mentioned here that the ENHG attracts only a limited and select audience that comprises the highly educated class who already hold interest in natural history.

2.1 STATUS OF ENVIRONMENTAL EDUCATION AND AWARENESS IN SCHOOLS

In the early '90s there were hardly any regular programs or projects aimed at inculcating environment education and awareness to students of all categories. Among schools following curricula other than the UAE, components of Environment Education were already incorporated in different subjects, but they were essentially textual and conceptual and lacked any hands-on approach. Hence the concepts taught lacked any link to real life situation or the local knowledge, as a result students passed out from schools without knowing about the wildlife or the natural resources or environmental issues in the UAE. The only exception being the Abu Dhabi Indian School. This school started the very first Nature Club in the emirate in 1990. The club was formalized in 1993, with a visit from the Ministry of Education (MOE) official. To this day the club is still very active, it commemorates all environmental occasions, recycles paper, and motivates students to learn about different habitats, flora and fauna in the emirate through actively promoting field research. The club reaches out to the community and to other schools through its annual Environment Awareness Week held since 1992 with inter-school environment awareness quizzes, clean ups and other activities.

2.2 EMERGENCE OF ABU DHABI ENVIRONMENT GROUP (ADEG)

The Emirates Environment Group, Abu Dhabi, later renamed as the Abu Dhabi Environment Group (ADEG) was established in 1991 along with the emergence of Emirates Environment Group in Dubai as a separate, and an autonomous wing in Abu Dhabi. Its goal was to *'make residents of Abu Dhabi aware of what they can do to make their world a better and a cleaner place'*. ADEG was essentially a multi-national and a multi-ethnic group, consisting largely of committed and motivated residents. This was perhaps the first group that tried to reach out to the whole community and to school children.

The then, Food and Environmental Control Center (FECC), provided the venue for the group members to meet.

While the Emirates Environment Group concentrated on a plethora of activities in Dubai, the Abu Dhabi Environment Group organized the following programs in Abu Dhabi

- **Community reach out:** Monthly lectures on varied environmental issues by experts were organized. The venue for these lectures was the conference hall of the Food and Environment Control Center. The lecture was open to all the residents of the emirate and was usually notified through the dailies.
- **Programs for Schools:** ADEG conducted and offered school presentations on topics like the marine environment, Abu Dhabi desert environment and air pollution and its effects to name a few.
- **Resource materials:** The education sub-committee of the ADEG helped produce resource material for teachers and schools. They compiled a bibliography and a list of resource materials, to aid teachers wishing to establish environmental programs in their schools.
- **Campaigns:** ADEG regularly conducted clean up campaigns, plastic bag awareness campaigns, and aluminium can collection campaigns among others.
- **Promoting recycling:** ADEG also tried to encourage school students and the community at large, to recycle aluminium cans and paper. The ADEG set up joint recycling centers in partnership with Abu Dhabi Oil Company (ADCO) and the Spinney's chain of supermarkets.
- **Green Awards:** The group also gave out awards for environmentally friendly schools.
- **Workshops:** The education sub-committee of the ADEG also organized a one day workshop on *Efforts towards Environmental Protection and Awareness* at the FECC in 1995. A resource person for this workshop was invited from the United Nations Environment program (UNEP).



Picture 2.1 ADEG - Workshop

This workshop was the last event organized by the Abu Dhabi Environmental Group, after which the group disbanded as per the instruction of Ministry of Labor. This was due to the fact that the group lacked the legal framework to continue. The group had good programs, and managed them well.

2.3 ARABIAN LEOPARD TRUST (ALT)

The Arabian Leopard Trust (ALT) was established in 1993, when a spate of killing of leopards and caracals were reported in the local press. They raised considerable awareness about endangered animals in the UAE and also helped raise awareness about native cats, through their presentations different groups and schools in Abu Dhabi Emirate as well.

2.4 CORPORATE SECTOR EFFORTS

Year 1992 saw the advent of Shell Markets Middle East reaching out to students to promote environment awareness among youngsters. They announced an illustrated environmental essay competition for schools in the UAE and in 1994, and conducted the Shell Public Speaking Contest on the topic of the environment for all schools in the UAE. Since 1996, their efforts have become more focused with the Shell Better Environment Awards for schools that promote awareness campaigns and research projects among students. Besides conducting

these programs, Shell has put in considerable efforts with other disseminating bodies by sponsoring their education and awareness efforts.

2.5 ENVIRONMENT FRIENDS SOCIETY (EFS)

The Environmental Friends Society (EFS) was the only NGO operating in Abu Dhabi during the mid 1990s. The promotion of environmental awareness is one of the stated aims of the society. Though membership was open to all members of the UAE community, it did not have adequate representation from all communities.

Major thrust of EFS activities stated was as follows:

- To have a student's awareness program on environmental matters
- To participate in environmental exhibitions
- To conduct lectures and presentations on a variety of environmental topics
- To produce publication on environment

Despite the stated objectives of the group, initially the EFS programs were sporadic in nature, and reached out only to a select audience. Currently however EFS has become more focused in its approach and has also reached out to promote recycling among all residents in the Emirate.

2.6 EMERGENCE OF THE EMIRATES ENVIRONMENT GROUP (EEG)

With the disappearance of the Abu Dhabi Environmental Group, a void in efforts at environmental education with and in schools was created. This gap was to the eventually filled by the Emirates Environment Group based in Dubai in the mid 1990s. The EEG concentrated initially on promoting recycling with certain select private and government schools when it started its awareness program with schools here in Abu Dhabi. EEG eventually expanded its network of schools in Abu Dhabi. EEG's activities and campaigns were extended to all Emirates including, Abu Dhabi. Regular monthly meetings and lectures are open and free to all. People from other Emirates including Abu Dhabi attend these lectures. In 2000, the EEG expanded its horizons to target many more schools and conducted environmental activities and programs, such as the popular public speaking competitions, recycling campaigns and clean up activities, and student and teacher training workshops. EEG's publications are also well distributed to members and concerned groups in Abu Dhabi.

2.7 THE FEDERAL ENVIRONMENT AGENCY (FEA)

The Federal Environment Agency (FEA) was established in 1993. Encouraging environmental education is one of its stated objectives. The aim of environment education and awareness for the FEA is to raise concern in the educational, social and cultural spheres and to increase environmental awareness in order to enable society to participate effectively in attaining the desired objectives to preserve and develop the environment. Initially, the FEA was busy preparing an environmental strategy for the country. It established a committee to create a National Strategy for the Environment.

One part of this report was on Education and Environmental Awareness -Objectives and Policies. As a result of this report, the FEA incorporated a public awareness section with a dedicated staff.

Until 2002, the activities of FEA included:

- Conducting random visits to schools
- Participating and organizing exhibitions to show case the country's environmental commitments and achievements
- Promoting and supporting environmental competitions such as the annual Shell Better Environment Award
- Participating in and organizing conferences, seminars and workshops

Initially at the start the outreach program of the FEA was random and sporadic, later with committed staff at the environment awareness unit, it had a more comprehensive outlook. With restructuring of Government Ministries and departments, FEA's educational initiatives are now absorbed into the Ministry of Environment and Water.

2.8 MINISTRY OF AGRICULTURE AND FISHERIES (MAF)

The Ministry of Agriculture and Fisheries (MAF) started its program in the late 1980s, with a vision to be pioneers in establishing an efficient framework for practicing agriculture and agricultural development. The MAF did not have a department or personnel specifically dedicated for environment awareness. The targeted audiences for the MAF included the fishermen and the farmers.

MAF conducted the following:

- Regular meetings with the fishermen
- clean up campaigns (both underwater and on beaches)
- Awareness seminars to disseminate laws on fisheries to the fishing community
- Printed multilingual posters on environmental awareness
- Gave summer talks for students on pollution
- Participated and organized seminars, exhibitions and festivals on environmental themes
- During the government reorganization in 2006, the Ministry of Agriculture and Fisheries is now integrated

into a newly constituted Ministry of Environment and Water, which has a dedicated education and awareness section

2.9 FOOD AND ENVIRONMENTAL CONTROL CENTER (FECC), ABU DHABI MUNICIPALITY

The FECC started actively promoting environmental education and awareness in the latter half of the 1990s. Until then, it provided a podium for the Abu Dhabi Environment Group to function from its premises. It commenced its environment awareness program in 1998 and this has continued till to date. FECC started its educational programs by conducting lectures for both the private and the government schools once a week, accompanied by a video film presentation. In addition they also participated in many environmental activities held in the emirate through lectures, exhibitions and conferences. The most significant contribution was facilitating the Green Hoteliers association. Currently this association is not in operation but needs very much to be revived. With the establishment of Abu Dhabi Food Control Authority (ADFCA) in place of FECC, currently Abu Dhabi Municipality's efforts at environment education is currently restricted to producing *Bea al Sagheer*, a magazine for students, and participating in exhibitions, conferences and conducting workshops for varied audiences *etc.*

2.10 THE COMMISSION OF ENVIRONMENTAL RESEARCH, (CER)

The Commission of Environmental Research (CER), a wing of the Emirates Heritage Club (EHC), started with its environment awareness program in 1996. In general, they targeted all sections of society, but with particular emphasis on school and college students. All these programs were held at Sammaliah Island, just a few miles offshore from the mainland.

Originally, the education programs were a part of their general heritage promotion activities, but since 2000, a separate educational unit was formed with more manpower. CER started its Environmental Education efforts with the following activities, some of which it continues till date:

- It trained secondary and university students in environmental issues through active participation in field research. CER involved higher education national students to work with world-renowned experts to collect scientific data needed while doing

research to produce the Marine Atlas of Abu Dhabi Emirate.

- The CER organized and still organizes summer camps for school students where activities related to environment are conducted.
- Conducted diving courses and taught how to collect environmental data for students of higher education.
- CER also targeted Scouting Associations by organizing environmental activities.
- Produced resource material in the form of publications in English and Arabic.
- The CER conducted and participated in number of environmental conferences and seminars.
- It also participated in beach clean up programs.

2.11 EMIRATES WILDLIFE SOCIETY – WORLD WILDLIFE FUND (EWS-WWF)

Emirates Wildlife Society is a national (UAE) environmental NGO established under the patronage of HH Sheikh Hamdan bin Zayed Al Nahyan to implement conservation actions for the protection of local biodiversity and promote sustainable lifestyles. EWS works in association with WWF in the UAE where the WWF UAE Project Office, established in 2001, was the first WWF office in the Middle East.

The strategic imperatives of EWS-WWF cover:

- Species
- Habitats
- Climate Change
- Ecological Footprint
- Natural Resources

Work carried out by EWS-WWF is implemented through

conservation, education and awareness and policy recommendations. EWS-WWF plays a valuable role in environmental conservation through the following activities:

- Helping protect biodiversity at key sites, species of special concern and ecological processes critical for the region
- Raising awareness and advocating actions to reduce the Ecological Footprint of the UAE (this is among the highest in the world per capita)
- Promoting sustainable lifestyles in the UAE
- Contributing to the shaping of a still evolving, institutional framework in the UAE, so that local, regional and global environmental issues are addressed together
- Highlighting the responsibility of the UAE on the international conservation scene.

2.12 ENVIRONMENT AGENCY ABU DHABI (EAD)

The Environment Agency Abu Dhabi was constituted in 1996 (formerly known as the Environmental Research and Wildlife Development Agency (ERWDA)). Right since its inception, it has been involved with environmental awareness and education.

The Environment Awareness and Public Relation Unit (EAPRU), of the agency in 1996 pursued environmental awareness with the media by giving regular press releases regarding environmental research carried out by the agency. (The agency was then an essentially environmental research and wildlife organization.) The press releases helped increase awareness among the public regarding the endangered animals in the emirate and efforts taken to preserve them. Around the same time, a small library was set up at the Agency's premises in Maqta for the scientists who engaged in environmental research.



Picture 2.2 Nature Bus for class room programs

Education about the environment actually began in the year 1998, when EAPRU was transformed from a unit to the Communication and Education Department (C&E). Educational efforts started targeting students with classroom modules on biodiversity. This was primarily undertaken by the interactive Nature Bus. This bus with its taxidermy specimens and games for the primary and the middle school students brought the desert and marine environment to the classroom. The pilot phase of this program first began with the private English schools and soon established networks and began disseminating the program with the government schools. Further the field trips to these two habitats also helped give hands-on experience to secondary school students. Good partnership with Ministry of Education helped expand the variety of Environmental Education programs offered to schools to include more themes for classroom dissemination, conduct campaigns, environmental competition and encourage students and schools to take up eco ventures. The year 2000 saw the Environment Agency declared as the competent agency to deal with all matters pertaining to environmental conservation and protection of the Abu Dhabi Emirate's natural resources. With the agency's mandate clearly outlined in its mission, the agency put forth increasing environmental awareness and education as its sixth strategic goal. The following action plan was laid down to achieve this goal:

- To develop a strategy for environmental awareness throughout the emirate's population
- Identify target audiences in environmental education and awareness
- Assess current state of environmental awareness
- Develop and conduct focused environmental awareness programs

- Educate and train UAE nationals in environmental awareness and education
- Enhance internal communication

In the draft action plan, it was outlined that all centers and departments in EAD have a responsibility to help increase awareness, but the Communication and Education (C&E) Department was held particularly responsible for environmental awareness and was assigned staff dedicated to this task. The Environment Agency has the distinction to be the first to appoint such staff for this purpose.

By the year 2001, the C&E Department had separate staff to take care of the media and publication section with a specially recruited media officer, graphic designer, cameraman and also a distinct educational unit with three education officers. For the education officers, one of the important target groups was the students and teachers in the formal education sector in both the government and private schools. The following activities and programs were followed until 2001:

- Formal education sessions for students within their school on environmental education and awareness
- Field trips for students
- Training sessions and support groups for teachers on environmental education and awareness
- Advisory service
- Competitions on the environment
- Campaigns
- Publications and audio visuals.

The C&E Department also helped other departments in the Agency to target specialist groups, such as decision-makers, researchers and journalists through methods such as:

- Conferences, seminars and meetings
- Exhibitions
- Press releases
- Outreach materials.

From the beginning, the Agency's educational programs have been designed to be as practical and as hands-on as possible, taking students and teachers out of the classroom to experience and study in the living environment. The Agency structured all of its Environmental Education programs within the context set by the Tbilisi framework. It designed its programs to help promote:

- *Awareness* - to help students acquire an awareness and sensitivity towards the UAE environment.
- *Knowledge* - to help students gain a variety of experiences and acquire a basic understanding of the UAE environment.
- *Attitudes* - to help students acquire a set of values and feelings of concern for the UAE environment, and motivation for actively participating in environmental improvement and protection.
- *Skills* - to help students acquire skills in the sphere of the UAE environment that could be useful in other walks of life.
- *Participation* - to provide students with an opportunity to be actively involved at all levels, in researching and learning about the UAE environment.

By the end of 2001, every educational module offered was fitted with a concept, methodology and a take-home message.

All field trips were designed to promote the idea of understanding and learning to observe inter-linkages in the environment. The Department also started targeting other target audiences such as Women and general public.

In the year 2003, the proposed draft action plan came into force with well defined task for 2003-2007. The target audiences outlined for environment education and awareness included:

- Teachers and educators
- Students (primary, intermediate and secondary)
- University and higher college students
- Professionals of all kinds
- Community organizations
- Youth groups, such as scouts
- Women;
- Industrialists
- Fishermen
- Farmers
- Falconers
- Divers
- Journalists
- Religious leaders
- Consumers
- Police and others in the judicial system
- Armed Forces.

With increasing environmental education and awareness activities and responsibility, the C&E Department was enlarged to form a division and renamed as Environment Education and Awareness Division with four distinct sub-units attached to it to fulfill its responsibilities in 2002. The library was also expanded with more resources and books and was opened to teachers, students, researchers, scientists and other interested parties.

Further, in 2008, EAD underwent additional restructuring and began shaping itself as more of a regulatory body rather than an implementer. The Environment Education and Awareness Division was renamed as the

Environmental Awareness Sector (EAS) and concentrated on environmental outreach and awareness building.

With 2005-2015 declared as the decade for Education for Sustainable Development, and the mandate of the Agency for promoting environmental sustainability and assume the role of a regulating and monitoring body in 2005, the recent 2009-2013 EAD Strategic Plan continued to emphasize the role of Environmental Awareness with the organization. Increased environmental awareness not only features as a key priority within EAD, but also as one of four other expected outcomes under the vision of a sustainable Abu Dhabi Emirate set by the Abu Dhabi Executive Council:

- Economic and social development managed in an environmentally sustainable manner
- An informed and aware population contributing to environmental sustainability
- A clean, protected and safe environment
- Healthy and safe working environments.

The current Education Strategy is based on the environmental priorities for the Agency and the emirate, with thrust on resource development, capacity building, increasing outreach through networking and partnerships, learning and sharing with best practices locally, regionally and internationally.

Under this new strategy, EAD's major statements for achieving its environmental awareness goals include:

- An awareness plan targeting all stakeholders.
- A mechanism to track and evaluate awareness levels for specific audiences.
- Developing, implementing and rolling out awareness program with both internal and external stakeholders.
- Networking and forming partnerships locally, regionally and internationally with organizations with similar objectives and learning from best capacity-building organizations to enhance awareness and increase outreach.
- Increase awareness through channels such as television and online media.

In addition, EAD has several initiatives planned meant to achieve its target statement, *“Enhance level of awareness and behavior on EAD’s priority issues by effectively targeting population through increased outreach.”* These include:

- Promote education and awareness to reach all
- Formulate an emirate-wide environment education and awareness policy and act
- Establish an Environment Institute
- Enhance awareness through communication
- Conduct an annual survey to assess level of awareness and behavior
- Enhance private and public initiatives on EAD priorities through a Public Relations strategy

In summary, while environmental education and awareness, per se, began in Abu Dhabi Emirate in the 1990s, no systematic outreach to students nor society began until the Agency started its structured awareness in 1998. The following presents a timeline on the evolution of education and awareness at EAD:

- 1998 – Interactive classroom program started with ‘Nature Bus’ to primary schools to give the desert and the marine experience inside the classroom to students – Started with 500 students.
- 1998 – The only ever ‘hands-on’ experience to the Desert habitat now covering many habitats started with 40 students and now has the capacity to cover more than 2000-3000 students
- 2000 – Annual environment competition – reaches out to all schools in the Emirate
- 2000 – Started EnviroSpellathon – Reaches out to hundreds and thousands of students
- 2001 – Public outreach (environmental occasions). People’s partnership for environmental protection efforts.
- 2001 – Women became important to us – Started with a program with 350 women and today have established linkages with all womens’ associations and clubs.

- 2002 – Religious preachers became partners in helping disseminate awareness.
- 2003 – Made fishermen partners in helping clean the marine debris
- 2003 – All are equally important and are needed for environment protection; started working out a relationship with social clubs and centers, participate with us in clean up campaigns
- 2003 – Received regional award for promoting environment education and awareness among the GCC countries
- 2004 – Received international recognition. Recipient of the International Globe Energy Award in the Youth category (Oscars of the environment)
- 2005 – Increased participation of all
- 2006 – Rethinking and restructuring for a world movement towards Education for Sustainable development and also EAD’s changing mandate – to a regulatory and a monitoring authority
- 2007 – Environment awareness stated as one of the top priorities for the Agency. Strategic planning to orient initiatives and actions to be in sync with Abu Dhabi’s vision and with other entities
- 2008 – Framed 2009-2013 strategy and initiatives for enhancing and tracking level of awareness.

Between 2001 and 2007, the now named EAS department pursued the programs that are detailed below. Some of these programs still continue to be conducted through the Environment Awareness Sector of the Agency as a process of phase and phase out mechanism or until such a time the targets to whom these programs were delivered are either capacity built to handle these by themselves or these targets are targeted through partners and other implementing bodies.

In the year 2008, EAD undertook a survey to better assess the pulse of the public on environmental issues regarding awareness and behavior. It was intended that the survey would provide insights on the impact of environment education and awareness programs conducted so far in the Emirate. In addition the results of the survey would help align and strategize for future awareness efforts, identify the most effective target groups and help to better develop programs.

As such, the main objectives of this survey were to:

- Measure awareness and behavior of the Abu Dhabi public on environmental issues
- Better understand the depth of connection between awareness and behavior
- Better understand the role of influencing bodies and their contribution to awareness-raising.

An independent entity 'Market Ways Arabia' was commissioned to develop the survey in close collaboration with EAD. The survey included many target groups with several methods for actually obtaining the survey data from respondents. The general environmental themes that were covered within the survey included:

- General environmental issues
- Water
- Waste/Energy Waste
- Bio-Diversity
- Pollution
- Global Issues

The results of the survey were used widely in this paper as it helps give deep insight and is the first ever baseline survey done in the Emirate. It is of course the intention of the Agency to continue tracking levels of awareness through regular annual surveys with its new role as a regulatory and a monitoring body. Following is the account of educational initiatives taken by the Agency since its inception till date.

2.12.1 Focused Awareness Program

This program targeted the student and the teacher community by enhancing the concepts and themes already taught in the classroom. The program attempted to give hands-on approach to the students, so as to translate the awareness gained to action. The program also helped the students rediscover their links with nature and stresses the fragile balance in nature's scheme of things.

It also targeted the higher educational establishments, with a need to orient the youth to green thinking, as they

are the decision makers of tomorrow. This was and still done by conducting regular workshops, lectures and seminars on general environmental issues in the UAE and also with special modules on the endangered wildlife of the UAE.

EAS believes environmental education and awareness should be accessible to all. Students from government schools, private schools, special needs schools, juvenile delinquents and orphaned children have all been included in any outreach campaign. Through the years, many parents and institutions have expressed their gratitude to EAD for the information it is trying to share.

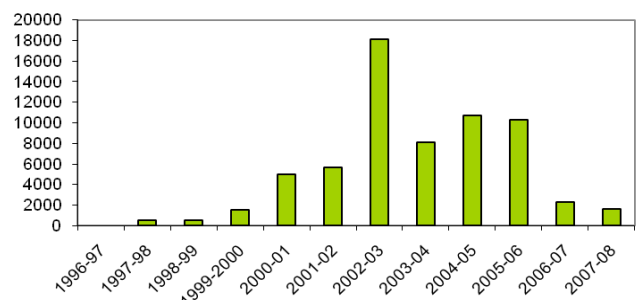
Teachers and other educators were trained by updating them on current environmental knowledge, and also by giving them an educator's forum to share and network among themselves. The themes offered in the focused programs for students were the following:

(See chapters for detailed concepts).

Classroom modules on:

- Biodiversity
- Waste
- Water
- Energy
- Ways to help the UAE environment
- Pollution
- The issue of ozone.

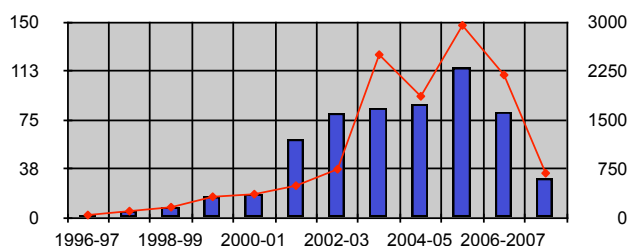
NUMBER OF STUDENTS TARGETED THROUGH CLASSROOMS



Progress with Classroom programs:

Short Field courses offered were:

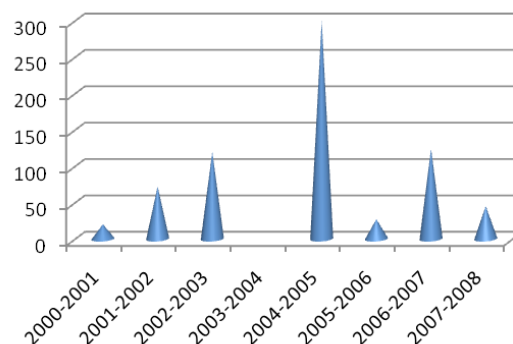
- Desert ecology
- Marine ecology
- Mangrove ecology
- Wetland ecology
- Wadi ecology
- Visit to Sir Baniyas Island, as an example of ex-situ conservation.
- Falcon hospital visit. Success with field trips:



A. Training of the Trainers

Training of the trainers was established to target the government school teachers. It was realized that, by training the teachers, benefits of environmental education can permeate to more students. Teachers are trained through workshops, seminars and presentations. On a yearly basis, at least two or three Training of the Trainers programs (TOTs) are conducted. Year 2003-2004, could not conduct any TOT due to some unforeseen circumstance. The Environment Educators at the Agency during this year also underwent a capacity building program to introduce interactive TOT modules to teachers. Year 2005 saw the introduction of new modules on Environmental Education for teachers.

Demand for education and awareness programs are constantly increasing, however, the programs cannot be sustained due partly to a change in the EAD strategic goals and limited resources. As such, interactive classroom programs are being reduced and capacity building within schools is being increased to train trainers, introduce environmental education into the curriculum and produce more resource material.



B. Environment Educators Forum

The Environment Educators forum was initiated in the year 2000, when to commemorate the World Environment Day, around 12 private school teachers met together for a one-day workshop to examine the environment education and awareness efforts in schools. This event was organized by the Abu Dhabi Indian School. A resource person for this workshop was invited from the Agency. At the end of the workshop at the request of teachers who attended the workshop, a forum was decided to be launched to be facilitated by the Environment Agency Abu Dhabi to help sharing and networking among private school teachers and for promoting environment awareness among students. Today this club is well known by its acronym TADPOLES (Teachers of Abu Dhabi for Protecting Local Environment) and has come a long way with more than 35 committed teachers as its members. The membership is free and open to all interested educators.

EAD facilitates this club by organizing:

- Regular monthly meetings
- Brainstorming sessions on the Environmental Agency's student programs
- Presentations by experts on current environmental issues to update the educators
- Field trips to special areas of interest for the educators

C Efforts with Higher Educational Establishments

EAD has established a good network with all institutions of higher education, with an effort to initiate and motivate youth into participating in environmental efforts.

Higher Educational Establishments are regularly exposed to:

- Presentations on major environmental issues facing UAE
- Workshops on environmental issues in the UAE
- Field trips to different habitats and areas of environmental interest
- Training opportunities for national students in higher education.

D Enviro-spellathon

The Enviro-spellathon, a sustained educational activity, started in the year 2001. It arose with a need to develop a program that could help target students en masse and across all disparate curricula in a sustained manner. In addition there was also a need to develop a program that could run in a smooth and efficient manner and would easily fit in with the normal school curriculum.

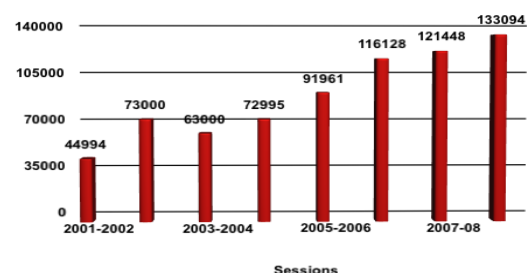
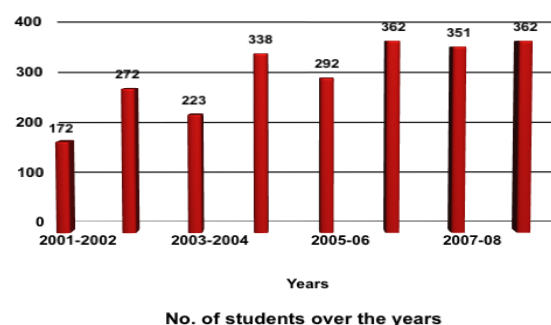
World Wide Fund for Nature (WWF) developed the concept of this program which it implemented in Pakistan. The agency adopted the concept, designed and developed it to make it specific to the local situation in the UAE. Currently in its seventh session, the program is going strong with support from the EWS and sponsorship from Shell Abu Dhabi since its inception. It is one of the most successful programs in the emirate, and yearly has reached out to tens of thousands of students and helped educate the students about the UAE environs and environmental problems.

EWS-WWF has continued to be engaged in environmental education and awareness programs and has maintained its partnership with EAD in organizing the Enviro-spellathon program. By planning and introducing the online version of the Spellathon activity in its eighth session, EWS –WWF has taken on more of an active role, which was promoted through the signing of a MoU between EAD and EWS-WWF in 2007. Since its inception, the program has now been taken to four additional emirates including schools in Dubai, Sharjah and Ras al Khaimah and has been engaging children in the study of the UAE environment.

The aim of this program is to:

- Promote dissemination of all aspects of local environmental knowledge, issues and awareness through the *Enviro-Spellathon*
- Assist in literacy in environmental and general vocabulary among primary and intermediate students and thereby target Environmental Education through the existing curriculum
- To have a sustained education program which grows with the child
- To cut across a whole mass of student population at the same time in a *structured* way
- Help instil sound *environment behavior or ethics* among the growing youth for a sustainable future.

This unique educational program currently works for seven levels of students between the ages of 6 to 13 with more levels to be developed with passing years. A booklet is supplied to each participating student commensurate with his age and he/she is then tested on the material supplied. Certificates and gifts are given according to the grades scored. Each participating school appoints a *spellathon* coordinator, who helps conduct tests, collates the results, and motivates other teachers and students to actively participate in the program.





Picture 2.3 Enviro-spellathon booklets

2.12.2 Awareness through non formal awareness programs

Focused awareness programs targeted students and teachers through the education system, by conducting programs that vibe well with the curriculum. Non-formal awareness programs were meant to be more participatory in its approach. The activities pursued under this program were essentially motivational and helped to promote commitment to the cause of environment amongst all. Hence the target groups for non-formal awareness besides including students also aimed at the general public, fishermen, women and other special interest groups.

Activities pursued under this program were :

- Annual environment competition for school students of Abu Dhabi Emirate
- Environment Excellence Awards for schools
- Commemorating environmental days and special environmental occasions
- Supporting and establishing environmental clubs

To involve the corporate sectors in promoting environment education and awareness, the activities mentioned above have been opened to sponsors from corporate sector. By committing to these programs the companies not only get a chance to adhere to their corporate social responsibilities but also commit for the cause of environment. Shell Abu Dhabi since 2004, under the Comprehensive Environment Education and Awareness Program proposal (CEEAP), has committed itself for a period of three years for most of the non-formal awareness program. In the year 2008, Shell Abu Dhabi renewed its commitment to the CEEAP program with the sponsoring agreement for three more years. All these programs continue currently except the environment excellence awards.

The following is a selection from the non formal awareness program.

A Annual Environmental Competition

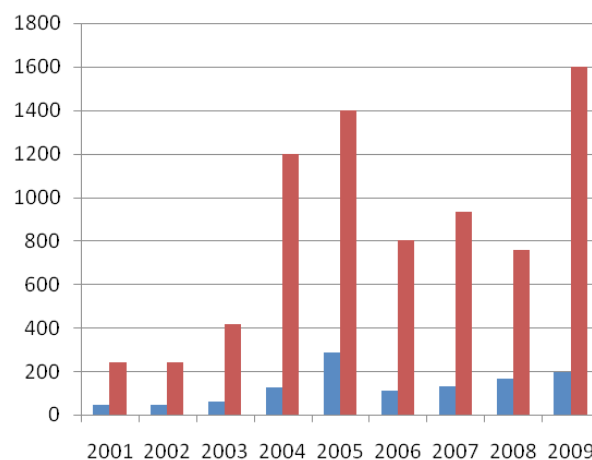
Structured educational programs very often appeal to students who are academically oriented, but may fail to provoke interest in a lot of students who may be more inclined towards a more action oriented or practical program. Hence, the annual environment competition

was started in the year 2001 and since then, participation in this program by the students has steadily grown.

The aim of this program is to:

- Raise environmental awareness in an action oriented manner
- Help raise motivational levels among students
- Help students to focus on a particular environmental issue
- Bring students and teachers from all schools together and contribute to the cause
- Reach out to parents and the public, with a focus on an important environmental issue and encourage possible, plausible solutions from the future generations.

Growth of the Annual Environmental Competition:



The Environment Excellence Awards for schools was established with the need to recognize the efforts made by the schools to promote environment awareness among the students, as well as the community. This was constituted in 2003.

This program aims to:

- Help increase the sense of pride among school authorities and managements
- Honor and give recognition to the educator and the educated alike

- Motivate the schools to have a more participatory approach
- Help to assess knowledge on nature and environmental issues and the extent of involvement with environment awareness activities practiced in schools
- Excellence awards were discontinued since 2007, with a view to integrate it into other initiatives as a part of the new strategic action

B Commemorating Environmental Occasions

Commemorating environmental occasion is very participatory in its approach and gives us a good opportunity to reach out to the general public and the relevant stakeholders to alert them on environmental issues. In addition, it also gives an opportunity to the Agency to re-affirm its commitment to the national, regional and global level environmental issues. Since 2001, most days such as World Environment Day, World Water Day, International Day for the Preservation of the Ozone Layer, Arab Environment Day, National Environment Day, etc. have been commemorated regularly.

C Campaigns and Activities

Year-around campaigns and activities are organized either by the Agency or in conjunction with other organizations and parties. These vary widely in terms of themes and targets addressed from underwater and beach clean-up campaigns to raising awareness on water and energy use.

D Supporting and Establishing Environmental Clubs

This has always been one of the main strategic actions with the Agency in all educational and other institutions as it is the means by which one not only gets to learn more about the environmental issues, but also gets a chance to take action to improve their immediate environment. Environmental clubs can be operated with very limited funding, and they reach out to students, youth and even to social organizations. In addition, these clubs give a sense of ownership to its members that then helps promote commitment to the cause. The Agency has not only initiated environmental clubs in all educational institutions, but also gives all possible assistance to supporting existing clubs.

The aim of setting up environmental clubs is as follows:

- to extend the boundaries and scope of the formal education system;
- to promote experiential learning of and about the environment;
- encourage creativity and empower the students for constructive action;
- and to give teachers an opportunity to create awareness, build healthy attitudes among students and help them to take up activities in the real world.

E Introducing Environment Education in the Formal School Curriculum

The EAD initiated the establishment of a high powered committee to help green the curriculum in all UAE schools. Through this committee, it was hoped to make environment education more multidisciplinary in its approach by systematically introducing environmental concepts across all subjects. In addition, it was also aimed to alter the teaching/learning strategies adopted in environmental education to make it more process oriented through adhering to a more project based approach.

So far, the committee has:

- Identified the status and gaps in the current system operational in the school curriculum
- Established close ties with UNESCO and the GCC Secretariat
- Proposed changes in the syllabus to be approved at the GCC level before being incorporated in the school text books
- Identified and formulated the concepts to be introduced in the Government School Curriculum at all levels
- Workshops have been organized with other environmental organizations where feedback about content and organization encouraged

The status of this project is currently static as the whole educational authority establishment in Abu Dhabi is currently being reorganised and revamped.

F Programs with Women

The Agency initiated environmental programs with women as it felt that this would pay rich dividends. By addressing women it was felt the whole family could be targeted. Conservation of resources at the household level could be highly enhanced by addressing women. Women are regularly targeted on environmental issues by the Agency through:

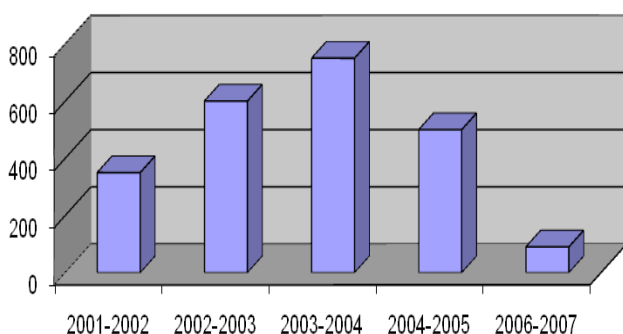
- women's associations;
- household visits;
- lectures at ladies' clubs;
- household surveys.



Picture 2.5 Inclusion of EE into curriculum meeting

Initially in 2001-2002, women were targeted mainly through household visits. Subsequently, in 2002-2003, networking with women's associations and clubs was established and regular discussions and lectures were held at these venues. 2003-2004 saw the Women's Program expanded to Al Ain and other regions. The main issues that women have been targeted on have been waste, water and energy. The agency is now examining the prospect of establishing a *green forum for women*.

No of women targeted over the years



Realizing the important role played by the media in spreading awareness, EAD established networks with, local, regional and international news networks. EAD gives out press releases and articles not only on EAD's activities and programs but also on many awareness issues to the print media on a regular basis.

EWS-WWF also initiated Project Eco Challenge with the Abu Dhabi Women's College where Communications Technology students developed coral reef conservation campaign materials. A children's film and a poster to sway public opinion on environmental protection were the winning entries in a campaign aimed at saving coral reefs from rampant coastal development.

The project's goal was to boost the effectiveness of conservation action in the country by encouraging community participation through educational institutes – to promote an education that also delivers an environmental education.

The project introduced students to topical environmental issues from which they selected the subject: coastal: development vs. coral reef protection. Consultations with various stakeholders, including developers, environmentalists, and marketing and media personalities, before the students ultimately decided in support of coral reef protection.

Campaign strategies developed by the students were then evaluated by a panel of experts carefully selected to cover both theoretical and practical aspects of the subject. The children's film, 'We are coral reefs', sporting a jingle of the same name, scored the highest, followed by a poster that showed construction looming over a coral graveyard and the slogan: Why are you killing us?

Project Eco Challenge will continue in the years ahead to engage youth in nature conservation and to help future communication professionals become environmentally-conscious citizens.

G Environmental Awareness through the media

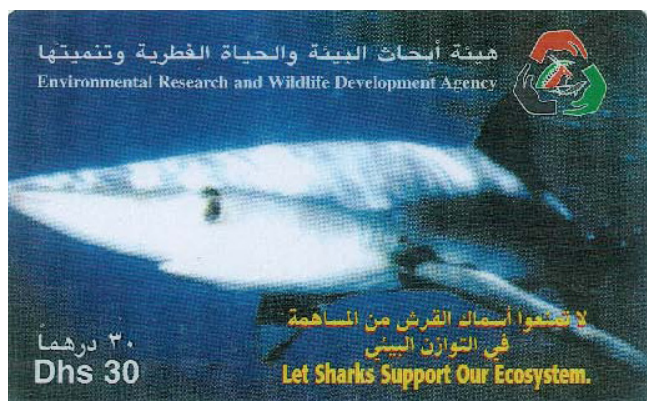
Realizing the important role played by the media in spreading awareness, EAD established networks with, local, regional and international news networks. EAD gives out press releases and articles not only on EAD's activities and programs but also on main awareness issues to the print media on a regular basis.

Efforts at awareness through the media by EAD can be summed up as:

- Targeting general public through the mass media
- Coordinating with postal service and ETISALAT Company to reach out to the public through environmental messages on cards and other postal material such as stamps etc
- Targeting decision makers through press releases and mass media
- Targeting professionals and scientists through organizing conferences and seminars
- Targeting journalists and other media professionals through training programs and workshops.



Picture 2.6 A Etisalat Card



Picture 2.7 A Etisalat Card

As an agency which conducted regular research on all environmental matters, it was left to the media section of the Agency to help communicate the research findings through organizing conferences and exhibitions. In addition to these conferences facilitating sharing and

communication of ideas and programs among scientists and professionals in the field, it also reached out to the public and students through the exhibitions.

The first international conference on environment started in the year 2001 under the patronage of Late H.H. Sheikh Zayed Bin Sultan Al Nahyan. This conference dealt with 'challenges and solutions for sustainable development,' (4 -8 February).

This conference came out with the Abu Dhabi Declaration on Perspective of Arab Environmental Action which recognized the urgent need to develop a clear vision and strategy for the future of a well-identified Arab environmental action. This conference was organized with GEC (General Exhibition Center) and supported by FEA, UNEP, ESCWA and other concerned parties and with sponsorship from oil companies and other corporate sectors. The conference was also accompanied by an international exhibition showcasing environmental technologies. Since then every alternate year, the international conference and exhibition have been regularly held on issues of international importance.



Picture 2.8 1st International Environment Exhibition and Conference

The second international conference and exhibition dealt with 'Environment and Energy' in 2003 (Feb2-5).

The third one dealt with Sustainable Transportation in Developing Countries in 2005.

In 2007, an international conference on Integrated Sustainable Energy Resources in Arid Regions was held.

Besides these international conferences and/or exhibitions, some of the other conferences the Agency helped to organize and host were as follows:

- The Second International Symposium and Workshop on Arid Zone Environments
- Symposium on Saker Falcon Status in the Range Countries.
- The Agency also helps host the Annual General Meeting of the International Association of Falconry (IAF).

To strengthen the media and to cover a wide range of environmental issues, EAD made a concerted effort to target the journalists and media personnel through organizing training programs.

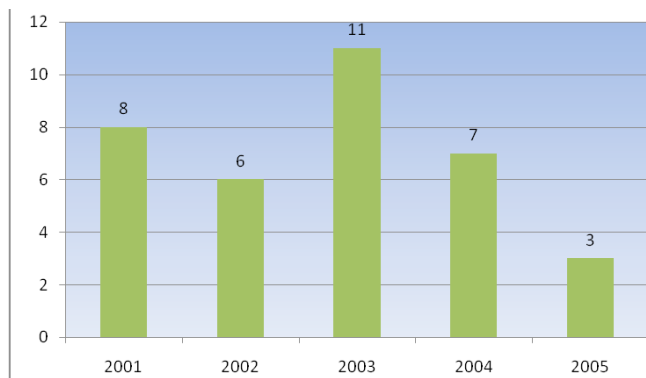


Figure 2.9 Video coverage of environmental issues by Environment Agency – Abu Dhabi

A seminar for Media was organized in 2000 which looked into:

- Current status with regard to covering environmental issues
- Gaps and problems
- Future plans.

Environmental Media Training Program (March 2003) was organized in collaboration with Environment and Development Magazine from Lebanon. The training dealt with:

- Environmental issues in the Gulf
- Searching for local and international information reference

- Development of journalistic skills
- Globalization issues.

The Agency helped host the First Regional Media Forum on Environmental and Sustainable Development (July 2003) in collaboration with UNEP (ROWA). The intention of this forum was to promote Arab concerns at the World Summit for Sustainable Development (Johannesburg, South Africa).

The media section of the Agency also boasts of a good video coverage of important meetings, conferences etc. Films promoting conservation efforts and other environmental issues have also been developed. These have been aired in the Emirates Television media. The following graph illustrates number of video coverage prepared by the Agency. These videos also act as a resource material for many.

2.11.3 The Environmental Agency Library As An Environmental Resource

The Agency's library made a small beginning in 1998, with a few books in the Maqta office. The Environment Agency's library today not only serves the needs of researchers and scientists working to achieve the agency's various strategic actions and goals but also for educators and other interested parties. In future, it is perceived to becoming an environmental resource Center in the UAE.

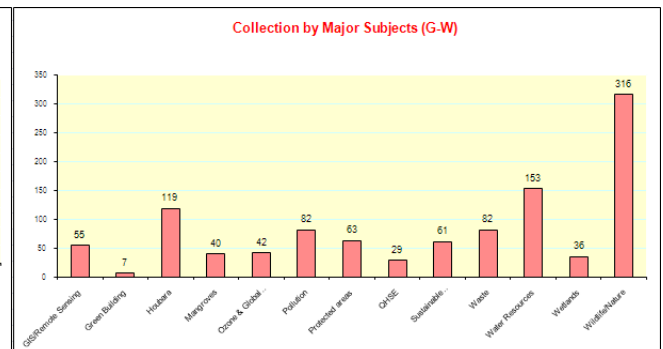
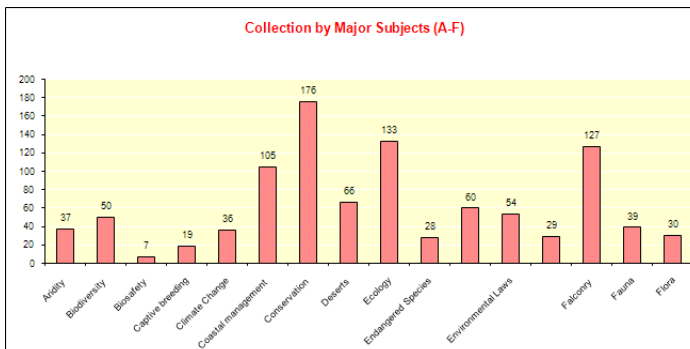
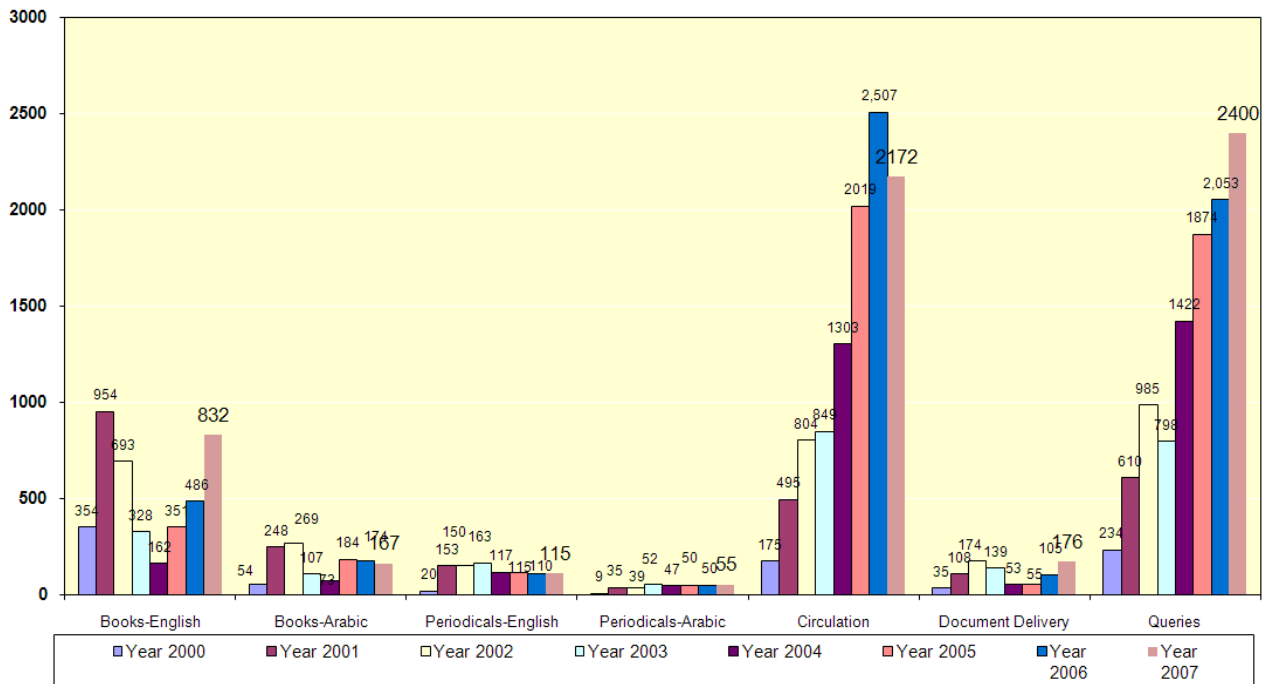
The Agency's Library boasts of a good collection of materials on subjecting ranging from Environmental regulations and laws, pollution, education, waste, water, flora, fauna and other wide-ranging environmental topics. In addition to books, scores of environmental journals, magazines, dictionaries, yearbooks etc. are regularly subscribed and made available to its readers

It also houses a good collection of videos, CD's and DVD. It also allows the staff access to on line book catalogue and e- Journals.

Currently the library operated in three locations:

- At the HQ of the agency in Abu Dhabi
- At the National Avian Research Center at Sweihan
- The Falcon Hospital.

EAD Library Progress: Year 2000-2007



Each library emphasizes the particular needs of the individual Center.

As mentioned before, the Environment Agency's library has been regularly used and consulted by educators, students and various professionals from other agencies and organizations.

In conclusion the education and awareness efforts pursued by EAD is now in the process of transition with a changed mandate, strategy and even restructuring of most of the government entities with whom these efforts have been carried on so far such as Ministry of

Environment and water, Abu Dhabi Education Council etc. Organizations such as EWS (WWF-UAE) are active players in implementing environmental education programs.

3 WASTE EDUCATION IN THE EMIRATE



3.1 INTRODUCTION

Waste is any movable material that is perceived to be of no further use and that is permanently discarded. (Jackson & Jackson, 1996). Once in the environment, wastes frequently cause damage to ecosystems and/or human health and therefore act as pollutants.

The UAE is one of the highest waste producing countries in the world. In the past, the UAE was a very environmentally conservative society. The current trend is a result of the increasing number of people adapting to urban standards of living. It is in the urban areas that waste becomes an issue and is not perceived as a problem with the people's 'use and throw away' culture. Between March 2008 and March 2009, it is estimated that a total of 4.89 million tonnes of waste were received for treatment and disposal in Abu Dhabi. 96.7% of this waste was disposed of in landfills. In addition, it is estimated that an additional 20% never reached treatment or disposal facilities, but was illegally dumped.

The urbanization process, particularly over the last 200 years, and within the last four decades within the UAE and in the emirate of Abu Dhabi, is a truly striking phenomenon. Many citizens live, work and have leisure time entirely within modern cities. Rapid urbanization seems to reflect rapid economic growth as well as the development of industry and transport systems. However, it is the use of the private car that is dominant in cities in this country that has allowed the 'urban sprawl' to continue well beyond the original boundaries of the city. A classic example of this is Dubai.

In the UAE, people originally came to the cities to earn their livelihood, for education, or better healthcare, but since the 1970s, there has been an 'urban revolution'. At the time of writing this, approximately 70% of UAE citizens live in urban areas. Urbanized areas are one of the most altered of Earth's environments and one of the most common physical impacts is overcrowding. Cities can alter the local climate, the built up land has a different percentage of albedo and heat storage characteristics from non urban land. Urbanization pollutes air and water and generates large quantities of waste that require disposal.

Waste products and pollution are the unpleasant price usually paid for urbanization and industrial development. When human numbers are low and have little technology, waste and pollution pose few problems. However, when people congregate in large numbers there are likely to be waste problems. Recently there has been a huge increase

in the rates of processing resources. Consequently, there is an increase in the waste generated by processing these resources. In the last four decades in the UAE and in the Emirate of Abu Dhabi, waste has become more diverse, has increased in volume, in virulence and often persistence.

It is usual to classify the waste either from its source as being domestic, industrial, commercial, medical or agricultural or on the basis of its virulence or characteristics such as toxic, hazardous, organic, chemical etc. From an awareness perspective this section will not go into details of classification of waste but confine the discussion to waste as general public perceives it, mostly from the domestic and commercial source.

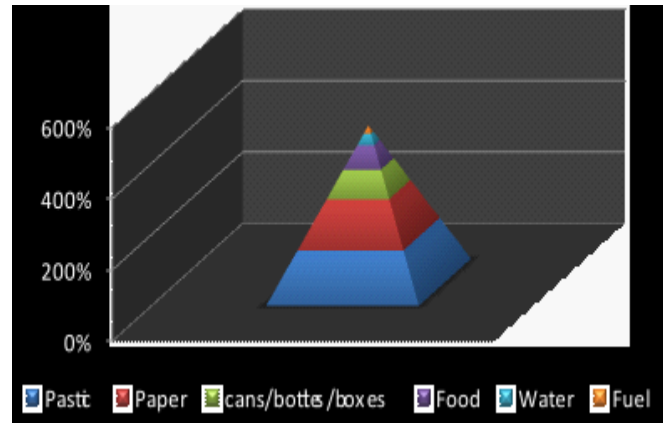
3.1.1 Problem of Domestic refuse

Cities can generate large volumes of domestic waste, up to 800 tones per day per million people. Domestic waste in a typically industrialized city is composed of:

- 7% Plastics
- 8% Metals
- 10% Glass
- 10% Dust
- 12% Textiles
- 20% Waste food
- 33% Paper products.

Estimates in UAE and in Abu Dhabi Emirate suggest that the majority of the waste consists of food waste followed by plastic and others.

From the Environmental Awareness and Behavior survey, it was revealed that the general public in Abu Dhabi Emirate perceived waste to be the most common type of waste, followed by paper, cans, bottles, food, water and fuel. Please note that this question in the survey did not distinguish between solid and other types of waste.



In modern industrialized societies, there has been a marked trend towards a greater proportion of packaging materials, much of this being non-degradable plastics. This is very marked in the use of plastic bottles rather than glass, and of course, the ubiquitous plastic bag. In the country as well as in the emirate today, increased affluence has meant that shopping has become a leisure pursuit and each citizen buys more clothes, accessories and electronic products than ever before. Each item is packed, sometimes several times, with a carefully placed logo in a prominent position for all to see. Packaging today is seen as an essential prerequisite in order to sell a product and compete with rivals.

Packaging is also closely associated with the rise of the 'fast-food' industry. Most of what our food is held in, and eaten with, will become domestic refuse after the meal is consumed.

The proliferation of computers in homes and offices has meant the use of more and more paper usually used for printing the work on. It has become normal practice to have a 'hard' and 'soft' copy of important items. Computers were launched into the world with the promise of paper-free office environments. Sadly, the reverse is true and more paper is used today than ever before, so much so, that it accounts for a third of all our domestic waste.

3.1.2 Who makes domestic waste?

The simple answer to the question is each one does, and this is part of the problem. This means that there are very diverse groups generating domestic waste which in turn creates problems for properly targeting a certain audience in a sustained manner. It also engenders apathy, where no-one is willing to take the responsibility for wasteful behavior.

Every single resident eats food and wears clothes. The vast majority also drinks water and other liquids out of plastic containers or cups, which are then discarded after a single use. Most citizens are regular consumers of paper products, whether it is at school, home or in the office. A majority of people also use metal and/or plastic objects on a regular basis, for instance, a television set, music system, computer or vacuum cleaner. The list is endless. However, one trend in the majority of cases has been to not try and repair this item or object if it no longer fulfils its function. Most often one tends to go for a replacement for what has been discarded. This trend has become increasingly common because of three factors:

- The increasingly complex nature of the objects used in everyday life means that the majority of people do not have the skills or knowledge to fix or repair items or goods.
- The competition between brands marketing the same product is intense. This means that prices in relation to income are low and often it is just not economically sound to repair something, which no longer functions properly. It makes more sense to buy another.
- Technology is moving ahead so rapidly that a product that no longer works would also be 'old' or dated. Consumers in affluent societies increasingly insist on the latest product, thereby prompting discarding of the old one.

3.1.3 Public awareness and perception on waste

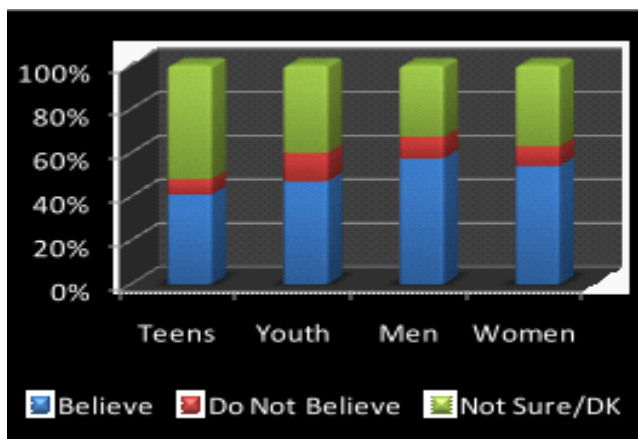
While everyone is aware that humans generate waste. It is also true that at the individual level there is also a lack of responsibility felt towards managing the problem. This comes about because of a number of factors:

- City dwellers are conditioned to accept a certain amount of waste as being 'normal', as being a part of everyday living. It is all around and part of life.
- Since humans live in crowded conditions in cities, there is a perception that individual behavior doesn't count for much. The majority behavior pattern rules, and becomes normal behavior. Unfortunately, this pattern of behavior normally manifests itself through the easy alternative, that of indifference to everything around.

- In some sections of the society, there is a perception that looking after waste is somebody else's job. Waste is considered dirty (which it often is) and it is beneath one's dignity to do anything about it. This pattern of behavior is re-enforced in the home by hiring domestic staff to take care of such issues and in public by the municipality hiring legions of workers to try and take care of such issues in public places.
- There are myriad cultures living in Abu Dhabi city, each with an idea of what is the correct behavior towards waste prevention and tackling waste issues. Rarely do these cultures agree on a common approach to this pressing issue.
- Modern lifestyles often entail long hours of work and/or study. The pace of life can be hectic in cities and everyone feels this pressure. Under such circumstances, it becomes easy to absolve oneself of social responsibilities towards society as a whole. People do the easy thing, what is right for them, often without considering the wider implications of their actions.
- Shoppers in the emirate often drive to large locations like supermarkets, which have a wide choice of goods and competitive prices to conduct their household shopping. Supermarkets compete with each other for customers; there is a perception among such firms that they need to 'look after' customers in the best possible way to make shopping and enjoy able experience. The result is that people tend to buy far more things than they actually need and much of it lands up as waste sometimes even without being used. In addition to the whole product, the multilayered packaging also joins the waste stream while being discarded.
- The Environmental Awareness and Behavior Survey EAD undertook in 2008 indicated that 52.4% of the public sample surveyed were aware of waste issues and only 42.9% of the sample expressed positive behavior towards waste management issues. Analysis of nationalities suggests that Asians and Westerners were more aware and also showed consistent behavior followed by the national and other Arab community population. Gender level analysis showed that women were more concern for awareness and behavior as compared to adult men. Children, though more aware, tended to follow adults in behavior patterns. Questions to assess public perception and awareness about high per

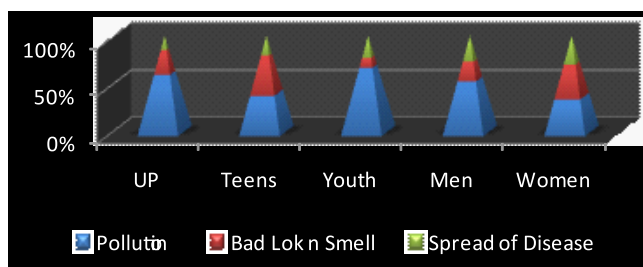
capita waste production showed that almost half the respondents, including most adults, felt that large waste footprint is a matter for serious concern, while 40-50% did not know or were not sure whether they should be concerned about the high level of waste production or not.

Concern about per capita waste production in the UAE



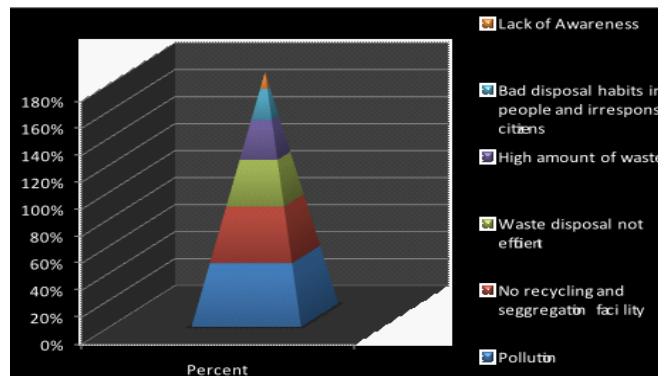
- As actions to manage waste among people are more often governed by their perception and their knowledge about the impact of waste, the question on the impact of waste revealed that 70% of the respondents did not feel that waste affected them directly in any way. They did feel that it impacted the environment, but did not see that as affecting them personally or directly.

Impact of waste on Environment



However public knowledge on issue regarding waste in Abu Dhabi revealed that lack of waste segregation and recycling facilities came out as the most common issue of concern despite wide variance in problems mentioned, in fact some of the respondents did not feel that there was any problem with waste in Abu Dhabi at all.

Problems related to waste in Abu Dhabi



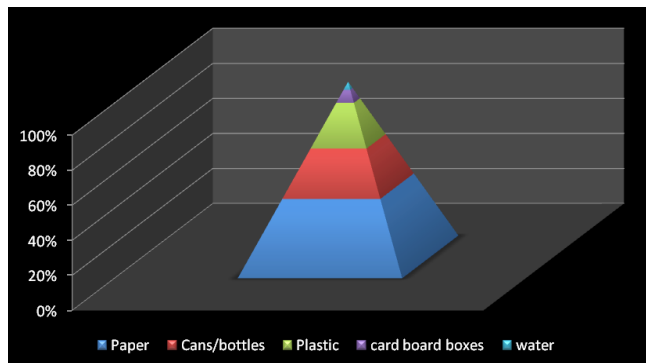
- All aware respondents were looking for facilities to recycle their waste, but lacking supportive infrastructure prohibited this positive response. It should be noted that the newly formed Waste Management Center – Abu Dhabi has developed a waste strategy that strongly promotes recycling and will be addressing the lacking infrastructure issue as part of its waste management strategy in the near future.
 - The Survey also indicated that while the public population had good knowledge of waste issues as they pertain to the environment, adaptive behavior was lacking, which may be likely due to the lacking infrastructure needed to support more positive behavioral responses.

3.1.4 Groups responsible for waste generation in cities

Collectively, each resident in Abu Dhabi is responsible for waste proliferation. However, it may be helpful at this stage to break down the groups into identifiable targets.

- All retailing and commercial establishment shops, hotels and supermarkets
- Construction industries and other industrial sectors.
- Corporations and offices that employ large numbers of people.
- All kinds of educational institutions
- All medical establishments
- Social and cultural associations and groups
- Agricultural waste which reaches the city
- Family waste - household waste.

What is and could be recycled currently in Abu Dhabi



- Paper followed by plastic were most mentioned recyclable items – followed by cans/bottles and water.
- Adults mentioned paper, food containers, plastic bags, bottles and bags being reused by them often in their households. While teens and youth mainly mentioned paper followed by plastic bags.

Already the extent of public awareness, concern and perception about waste has been mentioned above, as municipal waste apart from household waste also includes waste from the retail, commercial, hospital and other establishments, the survey concluded that Hospitals followed by Industry and Hotels were performing higher due to the nature of their industry and requirements to follow for waste management.

3.1.5 Target Groups Addressed

Various target groups have been addressed on waste awareness and education so far with varying degrees of success and frequency by different agencies and institutions.

Students: By far this is the group that has been addressed most by almost all the disseminating agencies.

General public: efforts have been made to reach out to the general public though only sporadically.

Women: Waste education has been addressed with women's associations and organizations.

Teachers: Teachers have been targeted through the training of the trainer program and through the school waste education program.

Corporate sector: Banks and other companies have been motivated to participate in the recycling process and in other waste awareness measures.

Industrial employees: The awareness efforts have been with reference to industrial waste.

3.2 METHODS THROUGH WHICH THE WASTE ISSUE HAS BEEN ADDRESSED

Different methods have been used by different disseminating agencies / institutions on waste education and awareness. The following is an account of each of the agencies and its efforts on waste education or awareness.

3.2.1 Environment Agency - Abu Dhabi

Environment Agency - Abu Dhabi started its waste education and awareness program in the year 2001, while expanding its focused awareness program (formal approach - targeting through the curriculum) with schools in the Abu Dhabi emirate. Most of the efforts have been in connection with municipal waste and to some extent with industrial waste with industrial employees.

The school waste education program consists of a thematically structured presentation with the students followed by an interactive activity. The concepts communicated vary in its complexity with the different age groups of students handled in the school. In general, three levels are offered: basic, intermediate and secondary. Though the focus programs offer many environmental themes, 'waste education' by far is the most sought after theme by the government schools in Abu Dhabi. On average, until 2005, nearly 3,500 students used to be targeted in an academic session through the waste education program disseminated with the government schools. The changing mandate of EAD, however, has created a void in this area as EAD is now in the process of transition from the role of an implementer to more of a regulatory and monitoring agency.

The following concepts are generally covered in different levels in the schools:

- What is waste?
- Kinds/categories of waste
- Sources of waste
- Increasing waste in the UAE
- Impact of waste on environment and humans
- Managing waste - the three R's (reduce, reuse and recycle)
- Efforts taken by the government
- How can you help?

The agency's Enviro-Spellathon program includes disseminating waste awareness through an interactive book, with a fun test for students in the junior level for students under 7 years-of-age. This age group was chosen as it was felt that this was the habit forming stage among youngsters with regard to 'litter consciousness'. On an average, this book reaches out to more than 8000 students below the age of 7 in government and private schools in Abu Dhabi. After laying the foundation about waste in very young children's minds, this issue is taken up again with the 12-13-year-olds through a booklet entitled 'Managing our waste'. On average more than 16,000 students participate in this level. As mentioned before, the spellathon is now also being offered online with EWS taking over as the main organizer.

Presentations and workshop on waste are also done with the higher educational students though not separately but as a part of the major environmental problems faced by the emirate.

Teachers are targeted under the training of the trainers' program through workshops on 'Best of Waste'. A major workshop on making the best of waste was conducted for art and craft teachers in schools with the help of experts. This was held with the view to motivate the teachers to include some of the lessons learnt in their art and craft classes. This was conducted in the first year when the waste education was started in earnest in September 2001. 50 teachers were targeted from the government and the private schools. Besides this workshop, a waste workshop is held yearly with invited resource persons with at least 2-3 government schools.



Picture 3.1 Enviro-Spellathon Waste booklet

Non formal awareness

clean up campaigns - World clean up Day is commemorated every year with clean up campaigns conducted with students, social centers and other members of the public. Besides this, 2-3 clean up campaigns with waste awareness messages are organized every year on an average. Since 2005 there has been a marked increase in the number of people and organizations wanting to volunteer for clean up campaigns. Each clean up campaign easily sees the participation of 350-500 people, signifying rising concerns among public

Motivating recycling efforts: - Recycling of paper has been encouraged in many schools in cooperation with a recycling company in Abu Dhabi. The Education and Awareness division of the Agency regularly entertains corporate sectors interested to start a waste management program by offering advice and suggestions to organize waste management efforts and puts them in touch with the company that offers recycling services for their waste. The National Bank of Abu Dhabi signed an MOU with EAD in November 2003 for matters pertaining to environmental protection and conservation and recognizing the role that it can play in such matters and the Agency's authority to offer suggestions and advice to take the necessary steps for that.

To begin, coordinating with the EEG, an NGO, EAD has taken up a dynamic paper recycling program given that the EAD has worked much with the corporate sector to promote recycling. In 2008, EAD assisted with starting recycling initiatives in over 20 companies.

Promoting the 'three Rs' and encouraging waste education through researching through annual environmental competition.

A regular feature of the annual environmental competition that is conducted with all schools in the Abu Dhabi emirate involves making models out of recycled material. Open to intermediate students, all the models are displayed for public viewing at a grand exhibition along with other entries. As a part of the competition in the year 2004-2005, students were asked to submit researched field reports based on a questionnaire survey with the public on 'Waste in the beaches of the emirate'.

In the year 2005-2006 students were asked to conduct primary research on 'assessment of household waste in their cities'. Through this research, senior students also reached out to the public to get their questionnaires filled and enhance public awareness on the issue as well. The Green Awards or the Environment Excellence Awards, which used to be conducted with the schools every alternate year, also included waste management as one of the main evaluating criteria.

Resource material: The Agency has produced public awareness materials on waste such as posters and brochures for industrial employees to promote awareness. The Waste Management Center, which has been recently established in Abu Dhabi Emirate, is working towards a big public awareness campaign on waste issues.

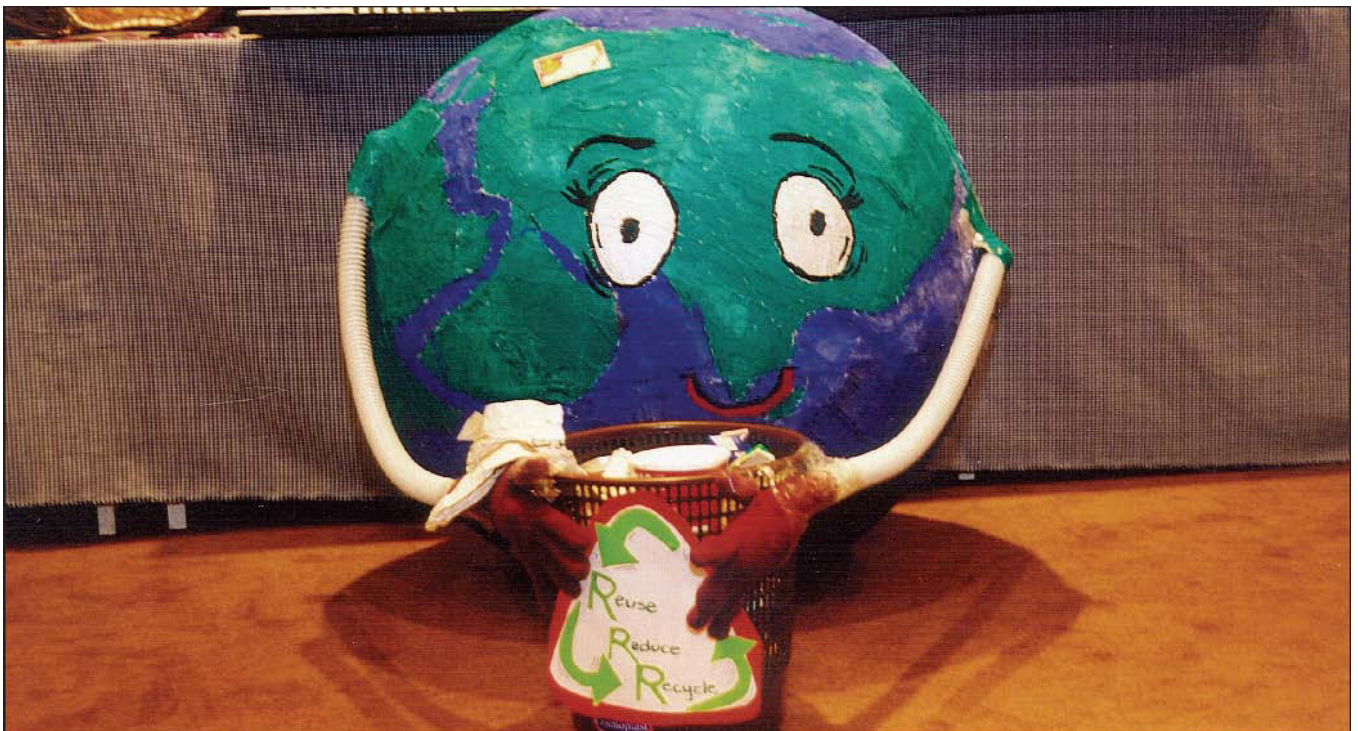
Disseminating awareness to the industrial employees through discussions and visits

The Environment Protection Division of the Agency regularly visits the industrial sites to ensure that the employees are aware of standard requirements for waste management by the industries in compliance with the environment protection law. The officers talk to the industrial employees on set procedures to follow. They also conduct workshops for industrial employees. Besides, they have formed a partnership with the marine police, customs, traffic police, the Planning and Economics Department in matters pertaining to curbing waste and water consumption.

Partnership with oil industries: - The Agency through its partnership with the oil Industries also regularly cooperates and supports the HSE awareness on issues concerning waste. In the year 2005, the agency supported and organized a waste awareness campaign as a part of HSE awareness with ADCO in Mirfa. Since then, the oil companies have regularly engaged with EAD and have participated in a number of workshops and clean up campaigns.



Picture 3.2 Annual Environment competition - models made out of waste material



Picture 3.2 Annual Environment competition - models made out of waste material

Waste is one of the priority issues for the Agency and as per the new strategy, EAD has reoriented its awareness programs to more issue based than target based awareness. Hence 'enhancing awareness on waste' is one of the initiatives to be pursued by the agency for 2009-2013. The main objectives of this initiative are as follows:

- Help reduce per capita waste through raising level of awareness.
- Promote recycling and reuse of waste through increased outreach activities
- Form partnerships and network with agencies and entities dealing with waste
- Promote safe disposal of waste among different targeted audience

The Agency plans to achieve these objectives in coordination with the recently established waste management Center and also with the networks already in place

3.2.2 Waste Management Center

In 2007, the Higher Committee for Waste Management was formed and chaired by the Secretary General of EAD. Other members of the Committee include:

- Health Authority Abu Dhabi (HAAD)
- Abu Dhabi Police
- Abu Dhabi Water and Electric Authority (ADWEA)
- Abu Dhabi National Oil Company (ADNOC)
- Executive Affairs Authority (EAA)
- Department of Municipal Affairs (DMA)
- Army
- Higher Corporation for Specialized Economic Zone.

The Committee established the Abu Dhabi Waste Management Center as an autonomous entity tasked with coordinating the delivery of the Waste Management Strategy throughout Emirate of Abu Dhabi through a full cycle, integrated, waste management system.

Population growth and increased development in the Emirate of Abu Dhabi are only some of the factor contributing to an increase in the development of waste, and at present the waste situation includes:

- Uncontrolled dumping
- Significant litter
- Limited recycling
- No uniform waste management practices
- High environmental impact

In an effort to address some of these problems and get a better handle on waste management within the Emirate, ADWMC was formed with some of the following responsibilities:

- To integrate waste management into a full cycle system
- To coordinate all waste management
- To develop a long term Waste Strategy
- To let and administer contracts

The Waste Management Strategy was completed in September 2008 and covers all aspects of waste management – beginning with the point of generation through to the ultimate treatment and disposal of wastes. The Waste Management Strategy will identify key areas, policies and regulations for targeted interventions to reduce and minimize waste generation in the first instance then to guide the recycling and disposal of the residuals in a manner that produces the greatest net social and economic benefits and the least environmental impacts. Waste awareness forms an important part of the waste strategy

The goal of the Waste Management Strategy is a "Cleaner Abu Dhabi". More specifically:

"Abu Dhabi will minimize the ecofootprint of the waste it produces and maximize the economic opportunities for recovering the embedded resources in a fully cycle system, by respecting the waste hierarchy, ensuring the polluter or user pays and utilizing the best global technologies."

3.2.3 Efforts by the Emirate Heritage Club

The Emirates Heritage Club regularly used to conduct educational programs on environment and heritage in Sammaliah Island. During these programs, boat races are conducted in which many national students take part. The Department of Environmental Research in the Emirates Heritage Club has established an Environmental Violation Committee, which has the authority to impose fines on boat owners who throw their waste or garbage out of their boats into the sea during these races.

Reaching out to all students

The Department of Environmental Research also conducts workshops and lectures for students in schools on waste regularly.

A public workshop on the rules and laws of solid and hazardous waste has also been conducted by the department.

The department has also formed a partnership with the NGO Environment Friends Society to make the 'Best of waste' with a project entitled 'Classification and recycling of waste with Model Schools in Abu Dhabi.

3.2.4 Efforts by the Red Crescent Society

Currently, with support from oil companies and in cooperation with Abu Dhabi Municipality the society is working on a campaign to clean up litter and waste in the desert and the beach.

3.2.5 Efforts by the Emirates Environment Group (EEG)

The EEG's waste management efforts started as early as 1991 when the group was established. One of its key objectives was to facilitate the 3 R's (reduce, reuse and recycle) among the community. EEG has placed focus on waste management and recycling as an effective method for preserving a clean and healthy environment.

With the years, the EEG's campaigns gained momentum and urgency, especially in the light of increasing waste generation in the UAE. The EEG has involved all the key sectors in promoting waste management as an 'environmentally best practice' and in propagating sound cyclical use of materials. The EEG runs annual collection campaigns for recycling cans, paper and ink toners. Recently they have launched programs to recycle glass and plastic. Below are tables giving estimates of

participation and collection of the paper, can and toner collection campaigns from inception till August, 2005.

(Please note that the following tables are statistics for the whole of UAE and are not indicative of what has been exclusively achieved in the Abu Dhabi emirate.

Year	No. of schools Colleges and Universities	No. of companies	No of individual	Total amount collected in tons
2001	26	53	5	79
2002	56	79	4	169
2003	51	113	15	274
2004	75	163	33	416
2005	61	184	73	644

Table 3.1 Paper collection campaigns from its inception through August 2005

Month/Year	Total No. of Participants	Quantity
May 01-May 02	129	2,322
Jun 02-May 03	96	2,472
Jun 03-May 04	93	2,290
Jun 04-May 05	83	2,226
Jun 04-May 05 Total	401	9,310

Table 3.2 Toner collection Data

Cycles	Individual	Companies	Schools	Total No. of Participants	Total volume collected (in tonnes)
1997 - 1998	-	-	15	15	1.076
1998 - 1999	6	2	31	39	7.814
1999 - 2000	15	5	18	38	4.543
2000 - 2001	6	6	28	40	7.1123
2001 - 2002	2	10	33	45	5.4585
2002 - 2003	8	18	33	59	5.0008
2003 - 2004	14	9	26	49	9.0025
2004 - 2005	57	11	44	112	9.628

Table 3.3 Can collection campaign – Breakdown of participants and total collection per category

3.2.6 Efforts by Abu Dhabi Municipality

Through clean up campaigns: The Municipality has been regularly commemorating the 'Clean the World' Campaign which started on 15th of September 1998. To date, more than 400 students from Abu Dhabi have participated in cleaning the Abu Dhabi beaches under this program. Besides conducting campaigns on their own, they have also participated in the Clean the UAE Campaign since 2001 with the Emirates Environment Group. The municipality has supported this program by involving an average of 2,000 students in cleaning the beaches of the emirate.

Organizing Lectures: The erstwhile Food and Environment Control Center had conducted lectures on recycling and managing waste by experts for scientists, environment professionals and concerned members of the local community on a regular basis since 2000. 50 lectures had been organized. Currently however due to reorganization of the Center there has been no follow up of this activity. Moreover, the Municipality had also increased the capacity of its compost plant to handle more waste.

Green Hotel Initiatives: The Municipality had helped establish and coordinate the Green Hotels Initiatives in the mid 90s with all the major hotels in the Abu Dhabi emirate with a view to encouraging them to categorize their waste and recycle and reduce their waste. The hotels had to take the initiative and select a coordinator from different hotels on rotation basis who would then conduct their meetings and waste management efforts with representatives and coordinators from the municipality. Currently the green hotel group stands dismantled.

Health - environment awareness with public: The Health section of the Municipality has been working with the public on issues of waste that may lead up to increase in pests, mosquitoes, rodents, dogs etc., which may have a significant effect on public health. It has been encouraging the public to keep roads, homes and surrounding environs litter free so as to avoid these problems. They have reached out through notices in public places or residential buildings. These health orientation and awareness programs on health and environment have been carried out by the Public Health section of the Municipality and have managed to achieve good results, especially with respect to the cooperation from the residents of the emirate on issues regarding importance of a litter-free environment. Health professionals from the Public

Health department have also targeted audiences from schools, clubs, and public places such as markets, parks etc. on issues relating to health and environment.

According to the Municipality, over 500,000 people have been targeted so far from various age groups over the past 20 years on health issues (1990-2005).

Efforts with students: A children's magazine entitled, 'Al Beyai Al Sagheer' with contributions from children themselves has also dealt with the issue of waste and recycling besides other environmental problems in its various issues. The magazine targets over 250,000 children in the Abu Dhabi Emirate.

3.2.7 Efforts by the Environment Friends Society

The Environment Friends Society is the main nongovernmental organization in the Abu Dhabi emirate. Like the EEG, the EFS too have started to promote recycling in schools, organizations and institutions.

3.3 LIMITATIONS TO EFFORTS ON WASTE AWARENESS AND EDUCATION

For education and awareness in this area to be successful, action has to be coordinated. It must be recognized that individuals are often included in more than one target audience and any campaign must complement efforts in other target groups. Too often, efforts have been *ad hoc* and piece-meal, targeting specific issues for different groups without covering and explaining the bigger problem.

Far too often, efforts have been conducted over a short time frame. This will have to change. In order to effect a lifestyle change in the majority of the emirate's residents, a prolonged and sustained campaign that covers all target audiences with a variety of complementary campaigns and educational tactics will be necessary. People must believe first of all that change is necessary; that change will be beneficial to their lives here, and that it is the correct behavior pattern to follow as a socially responsible citizen.

Even with good educational strategy to combat waste, a major impediment to waste management is that there are few waste recycling units in the emirate and they too ship the waste to the Asian subcontinent rather than recycle the waste here. So far, many of the waste education efforts have been only to get recycling bins installed in a school or an institution. It is up to one

motivated person from the school/ institution to take up the cause of recycling in his work place. With a high percentage of turnovers of the employees in different places, if that one motivated person leaves his/her institution, then the recycling effort in that institution comes to for the waste management concept to permeate to the whole society, it is imperative that a directive to segregate waste from the source from the decision-making authorities be set in place. Secondly, more recycling factories urgently need to be established, with the emirate now on a fast developmental track. It is reassuring to see that these concepts are now being considered by the Waste Management Center – Abu Dhabi.

One of the major issues faced by all the disseminating agencies is to convince the target groups that once they collect the waste it will be picked up on time, and that all categories of waste should be collected. As of now, there is hardly any collection of metals and minimal collection of plastics. Paper recycling is comparatively more in the emirate as it is more regularly collected compared to others (see appendix 1 for waste paper recovery statistics.) Very often, there is a sense of scepticism in the target groups as there is no set governmental directive to segregate waste. The population is willing to cooperate as concerns are high, but are looking for the government to take the firm action in this stance. The proposed actions by the waste management Center is likely to bring in a major change and hopefully the targets concerns would all be satisfied.

When all these key aspects are in place and take effect, slow but definite changes will be effected in the UAE society. All parts of our society must be involved, from the government, to big businesses, the media and individuals.

3.4 EFFECTIVENESS OF WASTE AWARENESS AND WASTE EDUCATIONAL EFFORTS

Currently there are many schools, colleges, and private and public sector establishments recycling their paper, plastic and metal. Unfortunately as this is done so far on purely voluntary basis.

With all the Environmental Education disseminating agencies promoting recycling amongst schools, colleges, organizations and institutions, awareness about waste has definitely increased, but this has not necessarily helped reduce the waste footprint of the emirate.

A regular structured waste education strategy targeting all audiences in a variety of different methods is needed.

Currently the success of waste education programs is measured by the number of recycling bins getting installed in schools, organizations and institutions where a couple of motivated individuals manage the waste on behalf of their institution.

Much of the waste recycling is also now being done with the spirit of competition. While this is not bad, it is not very sustainable, as it does not reduce the waste being produced from the source though this may increase the percentage of waste being recycled.

A good waste education strategy should try to target a lifestyle change and an attitudinal change at the individual as well as the societal level.

4 WATER RESOURCES



4.1 OVERVIEW OF WATER IN THE UAE

The sustainable use of freshwater is a matter of top priority for the United Arab Emirates. Indeed, it is so for the entire Middle Eastern region. Due to steep increase in population the demand for fresh water is increasing each year both in the UAE and also in the Middle East. In fact, the United Nations recognized this dilemma and predicted moderate to serious water shortages in many countries of the Middle Eastern region back in 1997.

The Middle Eastern region and the Gulf area in particular, have limited natural water supplies and combined with a spiralling rate of demand, suffers from a serious fresh water shortages. Currently however, this deficiency is made up through desalination techniques, which creates an illusion of abundance. Whether this process is sustainable for the foreseeable future is somewhat questionable and open to debate.

4.1.1 Key water issues in the UAE

- The UAE has the *lowest* national renewable water resource capacity
- The UAE has one of the *highest per capita* water consumption rates in the world
- 75% of all rainwater is lost to evapotranspiration
- 15% of all rainwater is lost as it runs into the sea
- Only 10% of rainwater actually recharges the aquifers
- Water extraction rates are greater than 1000 million m³ per yr
- Desalination accounts for most of the municipal water supply.

Water Consumption per Sector in Abu Dhabi Emirate (2006)

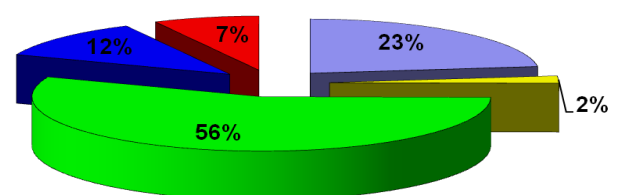


Figure 4.1 2006 Water consumption distribution for Abu Dhabi

These key points concerning water in the UAE make for disturbing reading. Two main themes come across strongly here, that of wastage and over-consumption and the increasing reliance on desalinated water supplies. Both these unwelcome trends need immediate attention from the government.

4.1.2 Status of water in the Abu Dhabi Emirate

Abu Dhabi, located in the drier regions of the country, has received lower than 100 mm/year rainfall in the last few years. With its population of 1.5 million people, it is also the largest and most populated emirate in the country. Unlike some of the northern emirates, it has no reliable surface water resources and has an even lower ground water recharge rate. The current ground water demand is 26 times higher than its renewable water resource. The Abu Dhabi emirate is mainly a downstream water user sharing a common border with Saudi Arabia and Oman. Abu Dhabi is also the second largest producer of desalinated water among the GCC countries and has the highest per capita consumption rate within the GCC countries.

The population in Abu Dhabi emirate has shown a 200% increase over the last 20 years and domestic water demands have increased by 400%. Today, desalination accounts for 96% of all domestic demands. It is also a fact that an average resident in the emirate today has a totally different lifestyle from that of a resident 20 years ago. Today's population needs far more water for consumption than what was needed 20 years ago. Further, efforts at 'greening the environment', (especially cities, and afforestation programs in the desert), increasing the areas under agriculture and the construction of golf courses, etc. all take their toll on scarce water supplies. Below is a figure showing Abu Dhabi's sector wise use of water.

In order to manage the water resources, it is important to look into the extent and availability of water from different sources. The Abu Dhabi Emirate utilizes water supply from three sources namely **a)** wells, springs & aflaj drawn from ground water source **b)** desalinated water and **c)** treated water.

4.1.3 Problems with ground water

Ground water is the only available source of fresh water in the Emirates. Problems associated with ground water include:

- depletion in terms of quantity & quality;
- declining water table leading to saline water intrusion;
- degradation in ground water quality further resulting in salinization of land and abandonment of farms, reduction in crop yields and variety;
- Degradation in ground water quality (increasing nitrate content) due to intense use of pesticides, fertilizers, and insecticides.

4.1.4 Problems with Desalination

In theory, this is a limitless supply. However, in reality, the cost of production and the effect on the environment of CO₂ emissions from the fuel (usually oil) used to fuel the process, mean that this source is only viable for providing high-quality domestic and industrial water. This too cannot be sustained with ever increasing demands without a significant impact to the marine environment. An estimate suggests that currently desalination alone contributes to 4-8 million tons of CO₂ per year.

In addition, because the Arabian Gulf is a relatively shallow sea the brine materials that the desalination plants release into the sea cause a problem for the marine ecosystems. Salinity levels have been increasing and there the capacity of the Gulf to support desalination is limited.

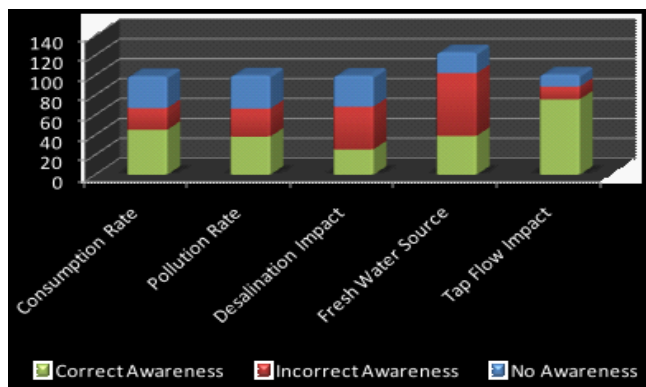
4.1.5 Water conservation

Conservation of water resources is a necessity, not an option. Managing the demand for water in the Emirate efficiently, for the correct use and for the most advantageous returns is imperative. An integrated water resource management needs to be set in place. It is clear that despite all efforts, self sufficiency in agriculture may not be possible due to harsh weather conditions and at the cost of declining ground water supplies. While one still needs to examine the full implications of establishing more desalination plants, demand for water is definitely bound to go up with the Emirate poised for fast pace of development, and also with increasing demand for water for domestic consumption. Hence it is vital that the Abu Dhabi Emirate sets an example in the country, at both the conservation of its water resources and its wise use.

4.1.6 Public perception on the issue of high water consumption

The majority of the Emirates population are residents for short period of time, for few years. The widespread perception among this sector of the population is to concentrate on their own circumstances and not worry or even think about the wider picture. Water is just one of the many facilities often taken for granted. It is expected to be delivered. Most of the residents use it without getting enlightened about its source and availability. The government is expected to take care and make it available. In the public survey that was conducted to assess awareness, only 20-25% of the sample surveyed in the Emirate correctly knew the fresh water sources. As high as 65-70% of adults and 45-50% of the students assumed that the main source of fresh water in Abu Dhabi Emirate was the sea and hence did not perceive a shortage in fresh water sources and the subsequent decline in water levels in groundwater. In all, nearly 35-55% of sample surveyed did not know of the environmental impacts on continuing with desalination and 30-40% did not know or were not sure.

Awareness Levels on Water related issues



There is an abdication of any individual or personal responsibility for careful water use. Most believe that water is an unlimited resource and because it is made available cheap it is also undervalued. This leads to widespread wastage among a large section of the population. Different nationalities living in the emirate interpret and perceive the use/misuse of water in different ways. An assessment of household water use, by nationality, can reveal the tendencies to misuse water for different purposes much more clearly. In the survey it was revealed that Asians had more awareness than other nationality group in terms of water usage, and within the Emirate, people from the Western Region were more aware about water issues than in Abu Dhabi or in Al Ain.

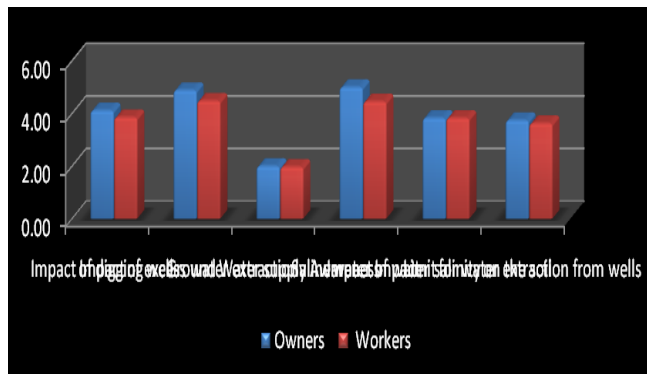
Perceptions about water use and its conservation are mostly governed by drinking water availability even though drinking water constitutes only a maximum of 2-4 liters per day per person of the total water used. The survey showed a high reliance on bottled water. Only 20% of the respondents believed that tap water quality as currently provided by the government was potable. Most thought that tap water was not pure and felt that pipes and overhead tanks in their apartment blocks were not cleaned frequently, while some even thought that it had germs. 60% of adults and 40% of children believed that bottled water was the best. 30% of the student population surveyed felt that bottled water added to plastic waste. As high as 73% respondents were using bottled water at the time of survey.

The key element in turning around this perception about water use and its conservation must be water education in schools. For the large percentage of people who no longer attend schools, the price of water is probably going to influence the pattern of usage. Quite simply, the more expensive something is, the more one values it and tends to use the resource in a more sustainable manner. This move by the government would be unpopular with many people, if implemented, but it is probably a very necessary step in order to rationalize water usage among large urban populations. In fact the current water master plan for Abu Dhabi is examining all of these aspects.

So far, most efforts at educating people about water use have been in the urban environment. This is both laudable and understandable in its purpose. As the agricultural sector accounts for substantial usage of water, it is imperative that this sector be targeted on a frequent basis. Most farms are small in scale and employ expatriate farm labourers to work on the farms. These farm labourers are not educated and hence there is a need for taking a multilingual approach and adopt a method most appropriate for effective outreach. Moreover these men have very little incentive to use water in a sustainable way. Most farm owners and labourers interviewed in the survey had good overall awareness on environmental impacts of digging wells, excess water extraction and use of saline water in farming. However, they were relatively less aware of the groundwater resources in the UAE and how long they will last. A high majority (80%) agreed that there should be a limit on excess water extraction, but again, there was a disconnect between their level of awareness and behavior while still having a higher level of awareness and behavior compared to other occupational and professional groups.

All stakeholders including farm owners, agricultural supervisors and farm labourers have to be targeted in an integrated manner to achieve desirable results.

Awareness & Behavior of Farmers -Water Issues



Perceptions about water use in Hotels, hospitals, corporate and industrial sectors revealed that hotels and hospitals had a higher level of awareness due to the nature of their work. However hotels, corporate sector and industries showed higher level of behavior. Hotels and Industry were found to have quite a few initiatives and mechanism in place for saving water.

The overall Survey on extent of environment awareness for the public sample revealed that 42.8% of the sample was aware about water issues but only 40.6% of the sample showed appropriate behavior. Of the environmental themes assessed as part of the Environmental Awareness and Behavior Survey conducted by EAD in 2008, it was found that the lowest level of awareness and behavior was that for water related issues. As mentioned earlier, respondents were not even aware of the source of fresh water in the UAE. This suggests that an increase in environmental awareness campaigns are required for water related issues, but also that more active water regulation is required by the Government of Abu Dhabi considering the very limited resources the region has to work with and the expected population and subsequent development growth to come in the coming years.

4.2 WATER EDUCATION AND AWARENESS EFFORTS BY DIFFERENT DISSEMINATING AGENCIES

4.2.1 Environment Agency- Abu Dhabi

Efforts by the Environment Agency on water education can be summed up by the following:

A. Efforts with students

Classroom Interactive Sessions

The Agency's water education efforts started in the year 2001. Initially it was intended mainly for students. Water education was introduced through the focused awareness program wherein an interactive module on 'Availability, Utilization, and Demand for Water in the UAE' was presented to the middle school students. This module consisted of a power point presentation, followed by an activity for the students.

Later, on demand, modules on water were also designed for the primary and high school students. Each of the modules was based on clearly defined concepts on water education to be communicated commensurate with the age of the students and method to disseminate the concepts. The follow up activities and games were also carefully designed. This has been the main strength of the Agency's water awareness program as students respond more effectively to a 'hands on approach' than to lectures and talks. They need to experience and find out for themselves facts about water. On average, until 2005, nearly 5000 students were targeted each year through these classroom modules on water.

With an avid interest shown by the institutions of higher education on the issue, interactive workshops have been held to motivate the youth and infuse them with a sense of direction to work towards a solution.

Presentations by experts were also made for teachers under the 'training of the trainer' program. The informal environmental educators' club (Tadpoles) hosted by the Agency also saw the inclusion of water awareness, presentations and discussions with educators and teachers on how best to disseminate this issue among the younger generation.



Picture 4.1 Commemorating World Water Day

Commemorating World Water Day

In the year 2002, an interactive one day workshop to commemorate the World Water Day (WWD) was organized in which both the government and the private school students and teachers participated. This workshop was a great success and schools wanted more interactive modules to be done at school. Since then, every year, specially designed programs and activities are held to commemorate the day. Activities for the World Water Day have now become more focused and target large number of people. They are designed on the basis of the theme for the year as declared by the UN. For example, the WWD activity centred on 'Women and Water' in 2005. The year 2006 brought together different communities in the Abu Dhabi emirate as the theme centred on 'water and culture' whereas the year 2007 centred on the theme of Water scarcity. This again saw participation and coming together of various communities in Abu Dhabi.

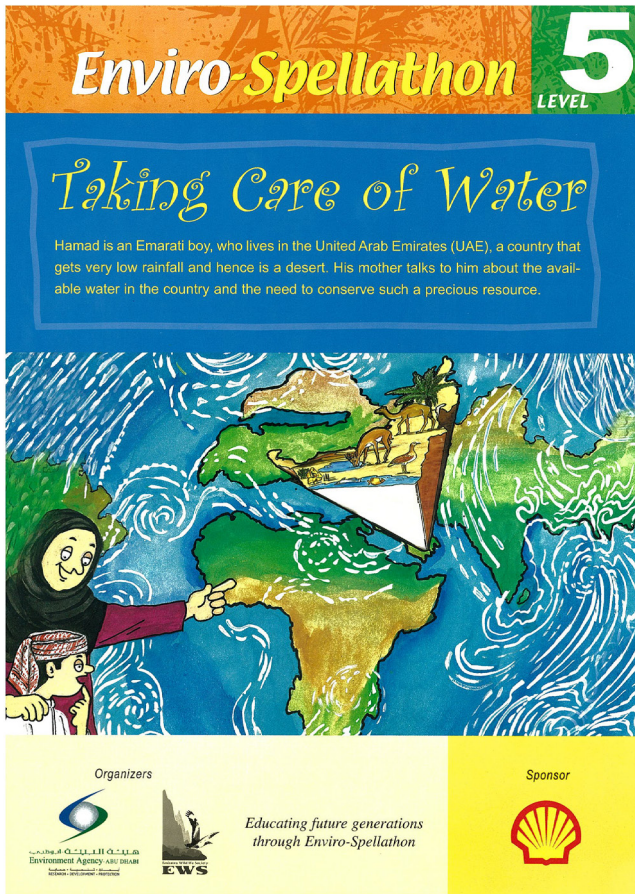
As a part of our non-formal awareness programs, students were also given a chance to express themselves through their creative and scientific ability on issues relating to water through paintings, poster making, and short stories and researched report on water usage at the annual competitions held for all schools in the emirate.

The annual competitions have played a leading role in getting the water conservation message across to

students of all ages and the following is just a sample of Environmental Competition 2004:

Theme - United Nations: 'International Year of Freshwater'

- Below 6 years - art work - '*Water Use*'.
- 6-8 years - art work- '*Misuse of Water*'.
- 9-11 years - caricature with slogan- '*Need to save water*'.
- 12-14 years - build a three dimensional model with the theme '*Water*' using recycled or reused materials.
- 15 years and above - individual entry - researched newspaper article on '*Environmental impact of desalinated plants*'.
- 15 years and above - group field research - '*Availability and Use of Water in Abu Dhabi Emirate*'.



Picture 4.2 Enviro-Spellathon booklet on Water

The Enviro-Spellathon program runs with upper primary school students to enhance their environmental vocabulary as well as to instil sound environmental behavior in the future generation consists of interactive fun books containing environmental information about the UAE. The Level 5 booklet of Enviro-Spellathon meant for 11-12 year olds, "Taking Care of Water" deals with this issue. Each year since 2001, over 12,000 students have been participating in this level and are also tested on the material given. This book has not only inspired and motivated the students to think about water conservation, but has impressed their parents as well! Teachers are very enthusiastic about the book as well as it helps link the concepts that they learn at school to a real life situation. As mentioned in the previous chapter, the current online version of the spellathon on water also helped increase outreach.

In addition, a major initiative at partnering for ESD is the 'Regional Flagship Project on Water for ASP net Schools in the Arab Region'. West Asia is perhaps one of the most

water stressed regions in the world. Perhaps more than anywhere else, it is the water scarcity that binds as well as causes friction among the Arab nations. Yet another fact is that students and youth form the majority of the population in the Arab world. UNESCO-UAE has been chosen to head this project and for the first three years Environment Agency Abu Dhabi is the international coordinator for the project. The project was launched in the year 2006 and is now in its second year.

- Specific objectives of the UNESCO water project for the Arab worldTo participate in water conservation activities to combat increasing and/or future scarcity
- To increase awareness about the quality of water that is available
- Promote sound water conservation behavior
- To induce positive changes in reducing current water consumption and help consumers make informed decisions about water use
- To develop effective educational approaches and make available good resource materials to support it
- To meet with the Millennium Development Goals and promote education for a sustainable future

The project aims include:

- To build a network of schools, teachers and other educational institutions in the Arab region on a variety of topics
- Develop a common program and joint activities and events
- Publish a water project newsletter and other relevant information

The Environment Agency, on behalf of UNESCO- UAE, has helped design and develop a water education module for the Arab world. The program has a three-step approach:

- Firstly, integrate water education with the curriculum through the Arab Water Education Pack (AWEP).
- Secondly, initiate an activity linking all schools through an annual project which will be participatory in nature and help gain skills, promote advocacy among students on water issues and also help network all the students' efforts.
- Last but not least, motivate students and youth through Water Leadership Camps.

Currently 12 Arab countries have come into the fold. The expected outcome of the program is to:

- To increase the willingness of students to volunteer and work for the cause of the environment
- Improve knowledge of geography and cultures of the countries in the region.
- In the year 2008, a workshop was held for coordinating teacher and national UNESCO coordinators from ten different countries for taking the pilot phase of the project further. Resource persons from South Africa, USA and India also gave their inputs into the workshop.

Water Target 350

In 2008, the EAD announced an ambitious program to reduce overall household water consumption from 550 liters per day to 350 liters per day by 2013. The UAE has one of the highest per capita water consumption rates in the world, and in a region that is at a high level of water scarcity to begin with, lowering overall water consumption is a necessity. The goal is to manage the overall water resources in a sustainable, economically viable and environmentally sound way to allow long-term development. The plan will include groundwater exploration, conservation of resources and careful management and planning. Of course, key to the success of the target 350 is comprehensive public awareness campaigns, field visits and other mechanisms to encourage people to use water more efficiently.

B Efforts with Women

The Agency perceives women as one of the contributors to an environmentally conservative household. Hence it regularly targets womens' associations to enhance their awareness about water, one of the easily misused resources at the household level. Presentations are organized with the Abu Dhabi Ladies' Club, womens' associations in Baniyas and Wathba. The expatriate women have also been addressed on the issue with presentations through their associations. To commemorate World Water Day in 2005, the Agency organized a one day water forum with support from the UNDP and the General Women's Union, in which 300 women of different nationalities participated. The forum also drafted an action plan to conserve water at the family level.



Picture 4.3 Door to door campaign to help conserve water

C. Efforts with the public

The World Environment Day 2003 with its theme of freshwater saw the participation of over 100 students in a march along the Corniche shouting slogans to conserve water and communicating with the general public regarding the same. Students held up placards and a 10-meter cloth banner signed with students' pledges and slogans to conserve water. Leaflets were distributed to the public and a public awareness quiz was conducted at a public mall which attracted lot of residents in Abu Dhabi. Water awareness also featured in the three-day workshop conducted for preachers and imams in the mosque in 2003.



Picture 4.4 Commemorating World Environment Day.



Picture 4.5 Students march to save water.

D. Efforts with the corporate sector

Awareness programs on water for the corporate sector were conducted as a part of the HSE campaign conducted by the ADNOC group of industries in their Ruwais residential area. The Agency helped bring out brochures, charted out and helped organize an awareness program for their community with a ‘family water saving’ competition, presentations with employees in their industries *etc.* Water awareness with oil industry has been carried on a regular basis each year.

An effort was made in 2003 by EAD to tie up with ADWEA to have a joint systematic program to target schools and students in Emirate.

E. Efforts with agricultural community

In 2004, EAD initiated a project on safe use of water and pesticides in partnership with UAE University, Ministry of Environment and Water and the Municipalities of Al Ain, Western Region and Abu Dhabi, farm owners, farm labourers, agricultural supervisors, and also the general public were targeted through this project. The main objectives of the project were as follows:

- To design and develop educational and awareness program which targets farmers, farm owners and the general public on the safe use of pesticide and water conservation
- To produce quality resource material about pesticides, its application and management
- To develop good awareness materials for the farmers aimed at judicious use of water

- Educate farmers and owners about the pesticide problem and its safe handling
- Ensure long term sustainability of the UAE’s natural resources

Since the initiation of the project, all farm areas have been visited and gaps identified through a target specific survey conducted in which it was found that awareness about use of pesticide was more than that of rational use of water and a strategic plan has been drawn for awareness. So far, over 200 farmers have been targeted through workshops and more workshops are planned to be conducted. Multilingual resource materials have been produced for farmers. The plans for 2009 include workshops for forestry sector employees and also a film to be produced for the farmers for easy comprehension.

F. Resource material on water

Resource material produced on water also includes awareness posters for students which have been distributed to all the schools in the emirate. A colouring cum story book entitled, ‘Martar’s Magic’ has also been produced and distributed to students and schools.

As the main coordinator of the UNESCO’s water education program for the Arab world, EAD helped design an Arab water education pack, and as mentioned above, a training program on using this education pack has also been conducted to flag the pilot phase. The pack consists of a water curriculum for primary, intermediate and secondary school water curriculum, teachers’ manual, teaching aids for the classroom and a student’s giveaway on water.

G. Water stakeholders dialogue

Environment Agency as a part of its strategy to partner and collaborate for effective and better outreach held a stakeholders dialogue of all entities involved with water utilization, production and distribution and agreed on principal to coordinate for better action. It was made clear to all that with no collaborative action we could run out of ground water in another 20 years, if no strong action was taken. The detailed action plan for engagement however has yet to be drawn out.

4.2.2 Efforts by Emirates Heritage Club

Department of Environmental Research in the Emirates Heritage Club undertakes water education and Awareness by **a)** organizing lectures and presentations on the importance of water for schools students **b)** conducting workshops in regulating water consumptions for schools in Abu Dhabi Educational Area. The Department also participated with DEWA on Water and Energy show.

4.2.3 Efforts by the Red Crescent Organization

The Red Crescent Organization as a part of their Healthy Schools Program, in cooperation with school authorities, is involved in a project entitled 'clean water in schools'. It educates the school authorities about the quality of water by making them aware about the need to keep the water sources of the school such as tanks and coolers *etc.* clean and safe.

4.2.4 Efforts by the Ministry of Agriculture and Fisheries

Ministry of Agriculture and Fisheries targets the farming community for water education and awareness.

Awareness efforts with farmers by MAF could be summed up as follows:

1. Conducts awareness programs with workers and farmers for proper use of water for irrigation purposes, with emphasis on avoiding overuse of ground water so as to avoid salinization of ground water sources.
2. Provides incentives to farmers who are committed to saving and conserving water.
3. Helps raise awareness with farmers on the impact of overuse/misuse of pesticides on soil, water and air.
4. Provides guidance to agricultural workers especially on the use of protective clothing while spraying pesticides and taking care of wind direction and proper location while spraying pesticides.

MAF provides training courses for agricultural professionals:

MAF regularly conducts training courses for agricultural engineers, advisors and other professionals for designing and maintaining good and optimum irrigation networks.

Currently, the MAF has been transformed into the Ministry

of Environment and Water and it was unknown at the time of this update whether the MEW took over the training courses that MAF previously held.

4.2.5 Efforts by the Municipality

The efforts at water education and awareness by the Food and Environment Control Center at the Abu Dhabi Municipality could be summed up as follows:

Targeting students through summer programs

Every year since 2001, a special summer program has been conducted for students from the elementary, primary and middle school on 'water awareness'. Each year, at least 200 students attend these summer programs. This program besides increasing awareness also helped build good behavior and personality among children.

Targeting professionals and scientists

Between 2000 and 2005, Municipality conducted 60 lectures at the Food and Environment Control Center of the Municipality on the issue of water pollution and adopting appropriate methods to alleviate water pollution in the emirate. These lectures have been attended by over 3000 experts, professionals, scientists and interested residents.

Efforts with Hotels

Efforts have also been made with the hospitality industries, namely hotels under the *Green Hotels Initiative*, in which all the hotels have been given programs and advice on reducing their water consumption and help in saving water. As mentioned this initiative has since been discontinued.

Targeting students and youth through symposium

Teenage students from different schools in Abu Dhabi were addressed on decreasing their water usage in addition to other themes such as waste and marine pollution during the yearly Youth and Environment symposium conducted since 2000. Many national and expatriate students took part in this symposium. The program also aimed at developing the scientific spirit amongst youngsters on issues concerning the environment. *Al-Beyai Al-Sagheer*, a children's magazine produced by the Municipality also regularly addresses the issues of reducing water consumption by students.

4.2.6 Efforts by the Emirates Environment Group

One of the most critical environmental challenges facing the Middle East region relates to water. This natural resource is scarce in the region, and a country like the UAE is affluent enough to source it out from the sea, but through the energy and cost intensive process of desalination. Utility providers in the country have on the one hand, focused on raising capacity of existing plants, and on the other hand they have highlighted the need for community awareness about water conservation. The EEG, being an NGO that keeps abreast of emerging key issues, has initiated knowledge and awareness programs on this issue. Given below are some of its most important water-related programs. Apart from these, the EEG continues to direct efforts in building community commitment to water conservation through its newsletters, magazines, lectures and presentations.

The efforts listed below include the EEG's efforts undertaken in Dubai, but all the activities have been open to the population of Abu Dhabi as well. Unfortunately there are no statistics to show how many of Abu Dhabi's population benefited from these activities.

Wonders of Water

This exhibition was conducted as part of the 'Water and Cultural Themes' of the Dubai Summer Surprises. It was held at the Holiday Center Shopping Mall from August 1-25, 1998, as part of the Water Surprises and Culture Surprises weeks. The project was sponsored mainly by the Department of Economic Development, as well as EEG members like Shell Markets, JW Marriott, Ducab and Al Fahim Group.

The exhibit consisted of a 2000 sq ft 3D model of the water cycle, together with sound and lighting effects. Featured were the natural cycle, local environment and habitats, human consumption and uses of water, desalination and water treatment plants, etc. The EEG distributed two publications that were released to mark the project. These were 'Save Our Water Resources' in English and Arabic and a poster on water conservation. EEG volunteers and guides facilitated interaction with visitors. Hundreds of families and thousands of individuals as well as groups of children from summer camps visited the exhibition. This became the most visited site of Dubai summer Surprise 98, as glimpsed by with more than 65,000 people. Visitors included UAE nationals and expatriates.

Water and Marine Conservation Leaflets

This project was part of a three-year education and awareness program, done in conjunction with EEG member Al Marai Co. Ltd, from 2002 to 2004. 30, 000 leaflets on water saving measures at home and the workplace and marine conservation were distributed to targeted student communities. The leaflets included a quiz and word-finders. A set of 50 copies were mailed to each school to be circulated among primary level students. Additional copies were distributed at exhibitions and EEG events. The quizzes were filled in and sent back to the EEG office. Correct entries received special T-shirts.

Stop the Leak

This was a project undertaken jointly with a corporate member of the EEG, Grohe Water Technologies, in 2003. An illustrated booklet was designed and published. 10, 000 copies were distributed among schools, and at EEG's monthly lectures and exhibitions. The theme of the booklet was water conservation through simple steps, and taught ways by which water use could be rationalized and water conserved at home, workplace or within the campus.

Get Water Wise and Win

This competition was organized in 2005 to commemorate the International Decade of Action for Water for Life. It was launched in March to mark the World Water Day, and ran till mid April. The project was taken up under the patronage of Dubai Electricity and Water Authority (DEWA) and supported by a member, Grohe Water Technologies. 30,000 copies of leaflets containing information and questions on the state of water in the Middle East region were distributed through 500 government and private schools to students in the 12 to 14 years age group. Fabulous monetary awards were given to the winners at a grand felicitation ceremony in May.

Student Workshops

EEG's annual workshops for the junior, sub-senior and senior levels involve hundreds of students every year. Topics addressed in the workshops are geared to increase knowledge about contemporary environmental issues and raise their commitment towards environment preservation.

In 2002, one of the topics dealt with in the sub-senior and senior workshops was the marine environment. About 200

students benefited from the exercise. In 2004, the themes of the three workshops were water and waste. Over 300 students took part in the workshops and learnt the basics of water and how to protect this critical resource.

In 2005, there were two presentations related to water conservation at the annual workshops. The first of these was on a local water saving campaign and the other was on saving water through treatment and re-use. The presentations focused on community awareness and protection to save this precious resource. About 360 students benefited from the presentations. Besides this, 150 teachers that attended the three-day event also benefited from the knowledge and training imparted through the workshops.

Public Speaking Competitions

The theme of water conservation features repeatedly in the annual, environmental public speaking competitions for schools and colleges organized by EEG. The competitions promote in-depth study and research into environmental issues, problems and challenges and encourage problem-solving skills among the youth. These highly competitive contests are judged by high-level experts from the public and private sectors. The Inter-college contest has traditionally been under the patronage of HH *Sheikh Nahayan Bin Mabarak Al Nahyan* and the Inter-school public speaking competition also enjoyed his patronage in the year 2005.

Topics related to water:

Inter-school Public Speaking Competition and Inter-college Public Speaking Competition 2002 - 'Water Conservation' and 'Marine Pollution'.

Inter-school:

There were ten participating teams for each of the above two topics, with five persons in every team. There were around 250 participants at the Inter-school event.

Inter-college:

There were four participating teams for each of the above two topics, with five people in every team. There were around 250 attendees at the Inter-college event.

Inter-school Public Speaking Competition and Inter-college Public Speaking Competition 2004 - 'Water,

water, everywhere and not a drop to drink'. There were 14 participating teams in each of the four topics and 300 overall attendees at the Inter-school event.

There were four participating teams and over 250 overall attendees at the Inter-college event.

Inter-school public speaking competition and inter-college public speaking competition, 2005.

2005 - Combating desertification - is it a lost battle? This topic also covered issues related to water.

There were 16 participating teams and about 600 overall attendees at this Inter-school event.

General Meetings

Every year, the EEG organizes a set of eight evening lectures for the community, delivered by environmental experts and specialists in related fields. These are called General Meetings and are popular among EEG members and associates, and media persons. The meetings not only facilitate exchange of information but community interaction as well. It gives a wonderful platform to experts to reach out to the community and brings them closer to the community at large. Various kinds of research and initiatives and many interesting issues are brought forth at these congregations, bringing benefits to the public who would not otherwise have access to such high profile information and expert knowledge. Some of these lectures have centred on water. See appendix 2.

4.3 METHODS AND EFFECTIVENESS OF DISSEMINATING THE MESSAGE ON WATER AWARENESS AND SUSTAINABLE USE

Many of the methods used for water awareness and sustainable use have been directed at school children and various interest groups like women. Methods have included competitions, lectures, games and sustainable water use materials, such as posters and books for the very young. With both the targets only a sustained awareness on the issue over long term using different methods will bring in dividends. Sporadic programs will only have a short term impact and lessons learnt would be soon forgotten.

As agricultural sector is held accountable for maximum water usage, perhaps more efforts at awareness need to be addressed at the Agricultural community. This could make a substantial impact on future water usage

in the Emirate. Therefore, EAD began a major program in conjunction with the UAE University and Ministry of Agriculture and Fisheries on safe use of pesticide and conservation of water with farm owners, supervisors and labourers in 2006. It would do well to keep in mind that, the agricultural community comprises of varied category of workers at different levels. Hence this calls for varied dissemination strategies, to be followed. The message should not only be multilingual but also be repeated at regular intervals to have the necessary impact. Thus far, EAD has held several workshops with farm supervisors and agriculture engineers, and developed multilingual brochures and resource materials for outreach.

It is not the intention here to recommend the abandonment of school and special interest programs, but that these programs run in conjunction with the above. To be effective, all segments of society must be addressed in different ways and the message must be continued. It cannot be denied that the Environment Agency's efforts in water education at school level have been popular with both pupils and teachers and have been effective in getting the message across, but what is more important is that the knowledge gained should translate in terms of action.

4.4 SOME RECOMMENDATIONS FOR SOLVING WATER PROBLEMS

Human society has developed a strategy for dealing with scarce resources, including water: the market. The market assures that the higher the price, the less a scarce resource is consumed and the more is supplied. If the price is right, there is potential for changing future water usage in the emirate. Modern fixtures and fittings can cut water consumption in cities by half and this is being done at the moment by the authorities. However, what must be closely looked at are both the methods of irrigation used on farms and the timing of such irrigation. Irrigating stretches of vegetation in the daylight hours when evaporation rates are high is a common practice. This must cease and night-time irrigation must become the norm. The demand for water could be cut further by taking a deeper look into the kind of crops that are to be grown by farmers. Water efficient crop combination techniques could be practiced.

The importance of the real cost of water must be realized by all people living in the emirate. Charges that cover the real cost of water will be unpopular among many, but it would be effective in cutting water usage, especially in urban areas, where most of the population reside. If this is not a possibility, then at least a ceiling on water usage

per family must be initiated based on average needs of households, those who exceed this could be charged heavily for over water use.

At the moment, the government is concentrating on how to increase supply to meet growing requirements. What is needed is taking a good stock of available supply and managing it more efficiently. Continuously satisfying growing demands would result in more water usage and waste. Economists and environmentalists can work in tandem: raising prices would promote a more efficient use of water in the emirate as well as in the UAE and taken together with the various measures outlined above, it would lead to a more sustainable use of water supplies.

5 BIODIVERSITY



5.1 INTRODUCTION

Biodiversity is a term that encompasses all the living things that currently exist on Earth (Cox & Moore, 2000). It includes all animals and plants that zoologists and botanists have discovered and described and also all those that yet remain undiscovered and await scientific description. In addition, biodiversity includes all fungi, bacteria, protozoa and viruses which, on the whole, are even less well known than the animals and plants. But biodiversity goes even beyond this. Considering the case of specie and analyzing its composition, it shows that, it consists of a series of populations, sometimes fragmented and isolated, and at other times adjacent to one another. Within these populations, there is often great variation between individuals. Biodiversity includes the whole range of populations, together with all the genetic variations found within each species.

Just as species are regarded as a collection of component populations, communities of organisms can be interpreted as assemblages of many populations of a variety of different species, all interacting together. These communities interact with their non-living environment and together they make up ecosystems. Any concept of biodiversity should therefore include the rich variety of ecosystems which occupy the earth. Efforts at conserving biodiversity should include conserving the ecosystems and their habitats.

Education and awareness is an important tool to help conserve biodiversity. This is aptly encapsulated by the words on Nature by *Baba Dioum*, a Senegalese poet,

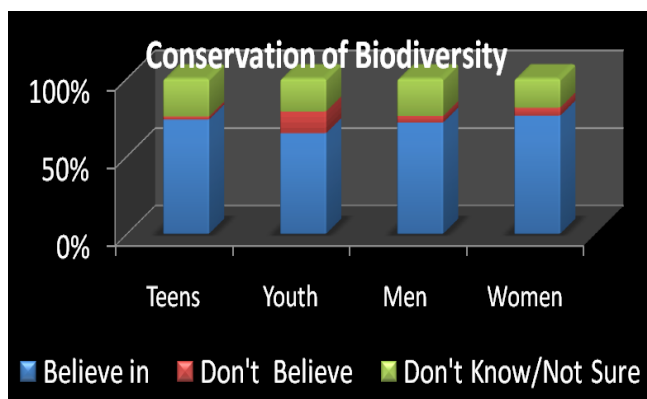
*"In the end we will conserve only what we love,
We will love only what we understand,
We will understand only what we have been taught."*

The loss of species of plants and animals calls for a concerted use of this tool. While there is an ongoing debate on loss of species about whether they are natural or not, the fact is Species are being lost at alarming rates hitherto unseen. Species are being lost both across the world, and in the United Arab Emirates. Recent extinctions of large mammals in the UAE include the Arabian Oryx (*Oryx leucoryx*), and the Arabian Wolf (*Canis lupis arabs*). There has been a dramatic decline in populations of the Arabian Tahr (*Hemitragus jayakari*), so much so that a viable population may be no longer present in the UAE. What are being witnessed are the last few individuals of a

species undergoing local extinction. It must be kept in mind that all these are the large mammals, relatively easy to record and document. What is much less easy to do is documenting the extinction of plants and the lower orders of animals. A disturbing fact is that, in some cases, one may be losing them even without having scientifically recorded their presence. The rapid development of the UAE, particularly along its coastlines, means that habitats are being fragmented, and in some cases, even destroyed. Extinctions in the UAE are the hard truth and it seems likely that this trend will increase in future, due to increased human activity. The greatest threat to wildlife is human destruction or alteration of natural habitats. Endangered habitats in the UAE include: mangroves; estuaries (khors); coastal deserts and island habitats. Environmental education in the UAE should study the environmental impacts on these fragile environments.

As everywhere, there is a general apathy about extinctions and threats to the biodiversity.

Importance given to biodiversity conservation to keep the biotic richness alive on earth has always been questioned by some at the global level especially at the cost of foregoing human comforts. It could be argued even more so, in the case of emirates which falls in desert biome with its harsh climate and limited biodiversity. It may be felt that importance given to biodiversity conservation in the Emirate may be highly over rated specially as even most of the school text books profess the desert to be a 'barren land'. It should be stressed that importance of biodiversity conservation does not only pertain to protecting numbers of species less or more but should encompass protecting the entirety of the whole ecosystem and the land itself.



In a recent survey conducted to assess the level of

awareness among the Emirate's population, while nearly 71% of the public sample surveyed believed that biodiversity needs to be conserved, still only 42.9% of the public sample surveyed actually showed concern and awareness about biodiversity issues globally and most specifically locally but their appropriate level of behavior to counter the impact the score that they had on biodiversity conservation with only 42.6% clearly showing a disconnect between awareness and behavior levels. In fact, awareness on biodiversity is next only to water issues which recorded the least level of awareness.

While the reality is that expatriate residents in the emirate are unaware of existence of varied life forms in the desert, the nationals are busy adapting to the new techno- urban ways. With fast pace of life and development, people have little time to bother about the fragility and beauty of the deserts and coastal areas. This is however truer with the current young generation than the old generation. The current trend in education for sustainable development urges to look inwards to the society and learn from its traditions. The logic for biodiversity conservation in the emirate is both a matter of protecting the fragile environment and also a matter of environmental ethics and tradition. Being an Islamic country, it is important to recall that Islamic teaching offers an opportunity to understand the natural order and human responsibility within the principles of 'unity of creation' 'humanity's place in creation', 'moderation and reason', and 'stewardship'.

Despite its harsh climate and low water availability, Abu Dhabi supports approximately 400 species of vascular plants, 50 species of mammals (native and introduced), 55 reptile species, 416 species of birds, between 4000 and 5000 species of invertebrates and a large number of marine species. Environment education in the emirate actually started with interest in learning about the biodiversity and with a need to save the endangered species (see History). Biodiversity education in the emirate shall be examined both at the species level and the habitat level.

While the detailed list of threatened species and habitats and causes of their threats are already being dealt with in other sector papers, it is necessary to orient this paper towards drivers and pressures leading up to the concern for loss of species and habitats. This would chart the course along which educational efforts should progress and also address the relevant targets and issues.

Population increase, urbanization, development

activities, increase in recreational activities and greening of urban areas act as drivers eliciting human responses which in turn exert pressures on species and the habitats. With a high percentage of population living in urban areas, composed of a huge expatriate population, the people are hardly aware of the actual biodiversity of the region leave alone the impact their actions have on the dwindling biodiversity in the emirate or the need to conserve it. Herein lays the importance of education for biodiversity. Once the population understands the importance of biodiversity, they are most likely to encourage and participate in activities leading to conservation and sustainable use of resources.

Education in biodiversity becomes even more important as the UAE has ratified the CBD (Convention on Biological diversity). The CBD clearly recognizes the important role of awareness and training to achieve biodiversity goals. It is therefore important to include all relevant stakeholders by targeting them through biodiversity education and involve them in conservation efforts.

5.2 TARGET AUDIENCE THAT NEEDS TO BE ADDRESSED FOR AWARENESS ON BIODIVERSITY ISSUES

Everyone is a stakeholder in education for biodiversity conservation. Keeping in mind that habitat conservation leads to conservation of species, the two major habitats namely the Terrestrial and the Marine should be considered.

Targets to be addressed for both the habitat and species conservation in some cases are the same; hence following is the list of all the targets to be addressed. The list given below is not in order of any priority, but need to be addressed with specific structured awareness programs as they form diverse groups with different social, cultural and economic backgrounds:

- Students
- Educators
- Developers
- Corporate sector
- Industries
- Fishermen
- Boat owners
- Island managers
- Falconers
- Women
- Decision makers
- Media
- Religious heads.

5.3 TARGETS AND METHODS OF DISSEMINATION BY VARIOUS AGENCIES

Biodiversity has received a lot of attention over the last decade. Most of the efforts so far have concentrated around a) students in formal education b) general public c) special interest groups such as fishermen, women *etc.*

Different disseminating agencies have followed different methods; details of the efforts by each are given below:

5.3.1 Emirates Heritage Club (EHC)

EHC's Department of Environmental Research's education wing has so far targeted students and women through lectures, field trips, and training sessions at Sammaliah Island. They have focused on mangroves, marine birds, turtles, reusing seaweeds and have involved students in conducting coastal surveys to produce a marine atlas of the emirate. They have also produced resource material for awareness and education. The following are some of the more important publications:

- a. Life and Distribution of Sea Turtles in the World;
- b. Mangroves;
- c. Marine Atlas of the emirate targeting professionals, scientist, students and decision makers.

The Department of Environmental Research also helped produce two documentaries entitled "Earth's Treasures" and an eight part series on marine life forms.

5.3.2 Abu Dhabi Municipality

Abu Dhabi Municipality regularly observes Plantation Week and encourages residents, organizations and schools to participate by giving free saplings. The Red Crescent Organization also volunteers with the Municipality in this effort. During this week, they also distribute books and leaflets about plants and trees in the emirate to help raise awareness. Plantation Week targets 5000 people each year. The Municipality also motivates farmers to collect their green waste for composting and reusing it in the fields in an effort to reduce the use of chemical fertilizers.

The forest section of the municipality distributes fruit bearing plants and believes that promoting forestry would help curb the movement of sand and sand dunes besides helping to keep the air less dusty. The engineering section in the municipality is in charge of providing green spaces in residential areas. The Municipality also encourages students to express themselves about the biodiversity in their Al Beyai Al Sagher magazine, meant for students.

5.3.3 Ministry Of Agriculture and Fisheries

The Ministry of Agriculture and Fisheries (now the Ministry of Environment and water), essentially targeted fishermen and farmers. To help protect marine resources, in the past they produced multilingual brochures and leaflets for fishermen on the rules and regulations regarding fishing, proper fishing techniques, marine debris *etc.* They are in charge of supervising fishing cooperatives and are in close association with fishermen. They pass all the awareness material to the fishermen through these fishing cooperatives.

5.3.4 Emirates Environment Group

EEG has reached out to the community on issues of biodiversity through their general meetings. These meetings are popular among media persons, EEG members and its associates. Experts on the subject reach out to the community, various research initiatives are brought to the fore and the public is given access to high profile information that it is otherwise not exposed to. Talks on marine species, pollution, and habitats have been covered widely in these lectures (see Appendix for the titles).

5.4 EDUCATION AND AWARENESS EFFORTS IN BIODIVERSITY ISSUES BY EAD

Environment Agency started its environment education efforts with wildlife and biodiversity issues. To date, the demand for these programs is very high. It realizes that the biodiversity is a unifying theme and can help students understand the ecological systems and processes that maintain life on Earth.

Education and awareness efforts have been made both on the ecosystem level and the species level. The awareness programs cut across the desert, mountain, marine, mangrove, wetland and wadi habitats and the species which have been focused upon till date and are both nationally and internationally significant, ranging from falcons, houbaras, the oryx and turtles to dugongs. The agency is well aware of the fact that awareness levels need to be raised with many more species but due to manpower and infrastructural limitations it has been unable to do so. It expects to redress the situation in the future. Education officers at the Agency are also trained by experts to tackle the various target audience groups. Listed below are the efforts that have been taken EAD as a part of the first environmental strategy which lasted until 2007. However, as previously mentioned, the restructuring of EAD through the 2009-2013 strategy,

the focus on biodiversity education and awareness is now changed to take on a more inclusive approach and enhance implementation with partners and with trained volunteer groups.

5.4.1 Efforts with different target groups

A Efforts with the educational sector

When EAD first started its educational program in 1998, it was observed that private schools following different curricula covered biodiversity concepts in geography and biology but that they were not local or UAE specific. The concepts taught were theoretical without any real life experience or hands on approach; hence it did not motivate any action from students on conservation issues here in the emirate. While the government schools learnt about the local flora and fauna, they did so without a good conceptual or theoretical background.

To begin with, a classroom module was started as mentioned in the history chapter with the 'Nature Bus', a vividly painted bus with scenes of the desert and the marine wildlife, providing the desert and the marine experience to the primary and middle school students. For the secondary school students, with the need to stress the experiential learning, 'hands on' field trips were introduced, first to study the desert followed by the marine habitat.

The teaching program up to the middle school level comprised a presentation, a game and an opportunity to feel and touch the taxidermy specimens. Later, these modules were given proper structures to target the limitations in the school curriculum.

The agency imparted classroom modules with clear well defined concepts, themes and learning outcome right from kindergarten to middle school levels. Interactive games and activities to convey difficult concepts like adaptations, food webs, ecological pyramid, prey-predator relationships, conservation and impact of human behavior are devised with every presentation covering different biodiversity themes and issues.

With the success of these programs, the Agency decided to take on an ecosystems approach in all its educational programs and help students to learn, to observe and appreciate the concept of 'inter linkages' and 'fragility of ecosystems'. It was hoped that this would help wildlife protection measures and promote sustainable development.



Picture 5.1 Marine experience to Primary students.



Picture 5.2 Desert experience to Intermediate school students.

Field trips

In 1998, field trips covered 40 students from two schools on a desert ecology field trip to Sweihan. Now, nearly 2000 students are exposed to different kinds of field experiences every year. In 2005 - 2006, nearly 3000 students have been targeted from private and government schools, however, the following year (2006-2007) saw a drop to 2000 students. With each passing year, field trips offered have also become more highly structured and innovative with a sound conceptual framework, methods and take home message.

General concept behind all field trips

- To provide a 'hands on' approach to environmental awareness
- To instil love, respect and regard for nature through interaction with it
- All field trips follow the ecosystems approach, by teaching them to observe the inter linkages that exist in the environment
- To stress the need to follow a multi-disciplinary approach in tackling environmental issues
- To help engage in scientific inquiry

Methods followed in field trips

- Visual presentations through power point, video and CDs
- Group discussions
- Develop skills in team work for environmental surveys- flora, fauna and a biotic parameters
- Simple laboratory techniques
- Analytical techniques

Field results of the field trips

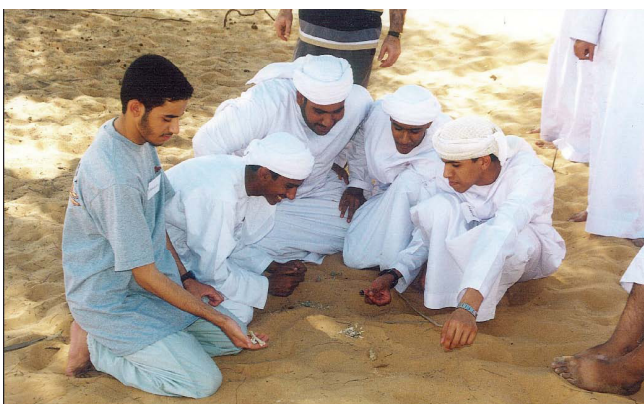
- Increase in knowledge about habitats and biodiversity in the UAE
- Awareness about the major environmental issues facing the UAE
- Introducing environmental awareness to the curriculum through designing and using our field work studies in their high school science projects or syllabi
- Inculcating a change in attitude - more care and concern about the state of environment

Concepts communicated through the desert ecology trip

- What constitutes a desert? - Climate and desert geo morphology
- The desert habitat is not barren-study of flora and fauna
- Intricate web of food chain and food webs that exist in Man's interaction with the desert in the past - e.g. traditional Arab falconry
- Efforts to preserve the tradition - captive breeding-case study of Houbara
- Human impact on the desert
- Interaction of students with experts-role models



Picture 5.3 Plant & Soil Survey in Desert ecology field trip.



Picture 5.4 Desert Ecology Field Trip.

Concepts communicated through the mangrove ecology trip

- Introduce students to what constitutes a mangrove
- Help them identify the linkage between the biotic and a biotic elements
- Highlight the protective and the productive functions of the mangrove ecosystem
- Awareness about the threats faced and the protection measures adopted by the agency



Picture 5.5 Mangrove Ecology Field Trip - Studying inter tidal zone.



Picture 5.6 Middle school students in the mangrove.

Concepts communicated through the wadi trip

- What is a wadi and importance of wadi in desert areas?
- Study of flora and fauna in the wadi
- Inter-linkages that exist in a wadi ecosystem
- Richness of biodiversity
- Need to protect the wadis

Concepts communicated through the marine ecology trip

- Case study of aquatic ecosystems - marine habitat, extent and limitations
- Study of inter-linkage between the a biotic and the biotic parameters
- Sub habitats within the marine ecosystems. Marine habitat as a resource base
- Sensitivity of the ecosystem and impacts on the marine species and marine habitats due to hard resource intensive activities
- Need to protect and efforts undertaken to conserve the system



Picture 5.7 Marine Ecology trip - Learning the use of GPS



Picture 5.8 Marine Biology Field trip - Measuring basic parameters of Water quality.

Concepts communicated through the wetland ecology trip, Al Wathba Protected Area

- Concept of a wetland ecosystem.
- Highlight positive interaction between man and nature, nature with industry/technology.
- Protected area concept.
- One to one relationship with nature.
- Observe and comprehend the inter-linkages that exist in nature.

Concepts communicated through the Sir Baniyas Island field trip

- Introduce students to concepts of 'land' as a mother of all resources, which can be used/misused and the implications.
- Highlight the development of the 'island' as an example of good Land use management.
- Concept of endangered animals, conservation/ different types of conservation and Sir Baniyas as an



Picture 5.9 Sir Baniyas Nature study.



Picture 5.10 Sir Baniyas Nature study

Concepts communicated through the Falcon Hospital trip

- Diseases confronting the falcons
- Dangers of overstepping the code of ethics
- Falcons and falconry (including the anatomy and falconry. physiology)
- Ecological importance of maintaining the Tradition of falconry. population
- Status of falcons and efforts to conserve
- Concept of sustainable hunting



Picture 5.11 Falcon Hospital - Learning about Falcon and Sustainable hunting

The mangrove and the falcon hospital field trips are offered to schools at two levels, one for upper primary to middle school students and the second level is from secondary level onwards to the university levels.



Picture 5.12 Addressing biodiversity issues with teachers

Efforts with teachers

- As a part of training of trainers program , teachers are not only trained in interactive methods to incorporate biodiversity themes into their classroom through activities and games but are also updated on biodiversity issues through workshops , presentations and training.

- Teacher training workshops and seminars are regularly held to update the teachers in current environmental issues, including wildlife protection issues.
- Training in taxidermy was given to government school teachers and was attended by at least 50 teachers.
- Conducted seminars and lectures for the Government school teachers on wildlife protection.
- The environment educators group (see History) targets wildlife issues through lectures on protection of wildlife, endangered species, CITES by experts and also by organizing field trips to protected areas and other areas of importance.
- Teachers have also been taken to Morrawah protected area in 2007 and in 2008 on two occasions to work out a possible education module centred on protected area so as to be able to take students to those field areas and also introduce them to the concept of protected area.

5.4.2 Non-formal awareness on biodiversity

Non-formal awareness was conducted to give a participatory and motivational approach to Environment Education. Each year students are given a chance to share their concern on vanishing biodiversity through the annual environment competition. Though the theme for the competition varies each year, the connection between biodiversity and other issues such as waste, water, global warming and climate change, etc. ensured that at least one of the categories of competition always centred on biodiversity.

The general public, students and professionals are also targeted by motivating them to participate in clean up drives conducted to raise awareness about the marine debris and the menace of blue plastic bag to the marine habitat. For raising awareness about the mangrove habitat, mangrove plantation drives have been held in the past with women and students on different occasions. In fact clean up campaigns are becoming a very popular activity through which public and corporate outreach is ensured. Each year the number of cleanup campaigns conducted has steadily gone up. In 2008, as a member of the higher committee consisting of Municipality, Emirates Foundation and other entities for Marine Debris Awareness campaign, seven cleanup campaigns were conducted along the coast of the Emirate in which 39,493 Kgs of marine debris were collected. The campaign also

reached out to fishermen through presentations and talks in addition producing multilingual posters for fishermen to enlighten them about the plight of the Gulf waters and its species

5.4.3 Targeting women in biodiversity issues

During the World clean up Week in 2003, lectures were given at the Ladies Club to help raise awareness among ladies to help instil the importance of leaving the beaches clean after their family outings to the beaches as marine debris is one of the most important issues facing this habitat in the emirate.

5.4.4 Imparting wild life education through the Enviro-spellathon

The Enviro-spellathon program (see history) also targets wildlife issues through its interactive books on 'Wildlife of the UAE' (7-8 years of age), 'Wildlife of the City' (8-9 years of age), 'Wildlife of the Deserts' (9-10 years of age), and 'Wildlife of the Seas' (10-11 years of age). These are supplied to the participating schools and students free of cost. These students are subsequently tested on these themes and prizes are awarded to students obtaining appropriate scores. This program has not only increased the wildlife vocabulary of students, but that of teachers and parents as well. The wildlife of the UAE and its concerns has now become a household concern. Outreach on biodiversity issues with students was further increased by the online version of the Spellathon launched by EWS – WWF as a part of their strategy as the main organizer of the spellathon.

5.4.5 Exhibitions and conferences

Target audience: Experts, professionals, corporate sector, general public

Exhibitions and conferences were held to raise awareness and enhance knowledge about wildlife in danger by EAD such as the following:

Dugong Exhibition

An exhibition was held at a public mall to raise awareness about the dugong. Activities such as a quiz, painting on 10-meter cloth etc. about the dugong and the need to conserve this animal were organized for families and children. The exhibition featured preserved skeletons, special posters and other publication material on dugongs to help raise awareness about these animals.

Arab Hunting

As a part of the Arab Hunting Show, a symposium has been held annually since 2003 on the conservation of falcons. The symposium is attended by experts, researchers, conservationists and leaders from local, regional and international organizations. The symposium stresses the need to enhance cooperation at all levels of research and policy to conserve falcons, and carry out coordinated efforts by national and international organizations to study its population biology and conservation problems. The symposium has issued a declaration calling for the development of a national legal regulation to conserve falcons and reorganize the CITES legal framework, including the Falcon Registration Scheme. Each year at the exhibition, a corner to promote kid's education is always promoted to reach out to students regarding the tradition and the knowledge about the majestic falcon and conservation issues associated with it.

Outreach publication materials

A wide variety of posters, books, videos and other resource material are produced by the agency to help its awareness and education programs on wildlife, (Dugongs, Turtles, Protecting the Mangroves, Protecting the Corals, Sea grass, Sharks, Reptiles and Birds, to name a few). These are given to all the targeted groups and are used regularly in all exhibitions and other public events conducted by schools and other educational establishments. There is much demand for producing age specific resource materials for all categories of students and for the general public, something that the new EAD Strategy is addressing.

Awareness efforts done for marine protected areas

The marine protection department of the agency which comes under the Biodiversity Management – Marine Sector rates awareness as one of the most important strategic actions for the management for the area. The target audiences identified for awareness measure are the following:

- Fishermen of all categories
- People who go fishing occasionally/seasonally
- People with fishing rights - residents who live part of the year in the island
- Commercial fishermen specifically
- The Municipality.

So far the target audiences so far addressed on the MPA awareness issue have been people who are residents or live for part of the year on the island and have legal fishing rights. They are addressed once in two months as they are seasonal residents and are not available on the island all the time. They have been targeted mainly through general talks in a friendly manner to comply with standard regulations as they have the right to the island and are the main stakeholders in the island. So far the awareness programs conducted have served the purpose for which it was intended and also the regulations have all been complied with as per the requirement of the law. Awareness for the general public has so far been done only through the internet through the EAD website. The website information on MPA is used by students, and the general public.

5.5 SPECIAL SPECIES AWARENESS EFFORTS

5.5.1 Awareness and Educational efforts at Houbara conservation

Sterling efforts have been put in to awareness efforts to conserve the houbara bustard, an endangered prey bird of the falcons. The Agency's National Avian Research Center has been actively involved with the captive breeding of this endangered species and raising awareness about the main ecological issues associated with this bird. The target audiences addressed by them are as follows:

- Leaders of the Nation (Sheikhs)
- Falconers
- Public
- Media
- Environmental Organizations (Local & Internationals).

The falconers have been targeted through the regular quarterly magazine and exhibitions and the rulers and the public have been addressed through good media coverage. Regular presentations and visits have been organized to the research Center for all the important stakeholders. Regular press releases have also been issued about the status of the bird. The efforts could be termed as partially successful. A lot of resource material for awareness has also been produced on the issue of houbara conservation.

5.5.2 Awareness efforts with Falcon Protection

Falconry is one of most important aspects of the UAE cultural heritage and is a very dear tradition. Falconry not only helped the Bedouins to survive in the harsh desert but also played a major role in shaping their innate character of strength, courage, patience, and tolerance.

To date, falconry is regularly practiced as one of the most important traditions in the UAE. Several falcon species are listed as a globally endangered under CITES. The UAE is aware of its tradition and the falcon's place in tradition has spearheaded sterling efforts to support conservation of these regal birds.

The Falcon Hospital which is established and supervised by the Environment Agency in Abu Dhabi with the Environment Education and Awareness Division of the Agency has put in tremendous efforts at spreading awareness and promoting education towards sustainable hunting. Currently at the time of writing this update on this sector paper Falcon hospital has now been ceded from the agency and has now an autonomous status but still continues with education and awareness efforts.

The target audience identified by the Agency includes:

- Falconers who visit the hospital
- VIP visitors who visit the hospital
- Students from schools to university levels
- Vets under training
- General public
- International Falconers
- Official delegations of the Ministry of Information
- Media and press

Practically all the audience groups listed above have been in one way or the other targeted for education and awareness about falcons, their sustainable hunting, promoting codes of ethics to be followed while hunting etc.

Regular visits to the falcon hospitals have been arranged for the targeted audience listed above. The Falcon Hospital has also taken part in the Arab Hunting Show by putting up display materials about the need for sustainable hunting, in addition to participating in exhibitions and conferences organized within the country and abroad. The methods of dissemination have been mainly through:

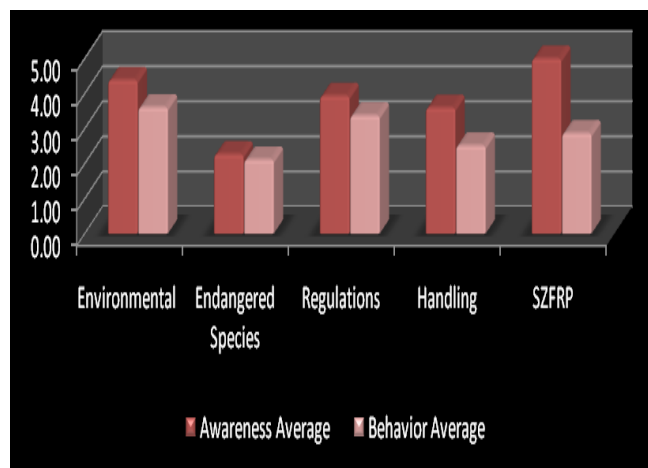
- Presentations
- General talks
- Video shows
- Brochures
- Films
- Posters
- Booklets
- Training programs and workshops etc
- Live shows of hospital services and procedures

The positive results of our falcon education programs are that they have increased awareness regarding the falcons and the efforts taken by the UAE for the protection of these birds. The educational efforts have also resulted in better animal welfare.

The level of awareness and behavior among falconers rated as average on issues concerning falconry in the general survey conducted to assess levels of awareness among different target groups on all environmental issues. The following is a broad outline of the findings from the survey:

- Most Falconers consider waste, air and water pollution as the most dominant environmental issues faced by UAE
- Almost all of them believe that these environmental issues have detrimental impact on the falcons by causing them illness which results in death and eventually reduction of falcons
- As high as 70% do not believe that trading of endangered species can cause impact on the environment
- There is high awareness of regulations related to protection of the endangered species and the organizations involved in it like CITES
- Most of the falconers abided by the regulations and avoided breaking them
- Most do not consider the protection agencies as a hindrance to their practice of this traditional sport
- Most consider lack of information and guidelines and advice as the main problem faced by them in maintaining their traditional sport
- There was high awareness of Sheikh Zayed's Falcon release program (SZFRP) with as high as 30% also participating in it

Please see graph below where all responses are in the form of ratings between 0-5 with 0 representing no awareness and the weighted rate of 5 signifying highest level of awareness.



Each of the falconers who come in are aware of CITES rules and regulations regarding falcons. The issue of CITES Falcon passports has effectively curbed trade in wild species for training or for hunting and has in turn promoted the use of only captive bred falcons for hunting.

Another very interesting feature of the survey was the responses from pet shop owners and traders. 63% of traders believed that keeping wild animals in the zoo is good for Human's pleasure, hobby as well as education. Only 30% of pet shop traders believe that trading in endangered species effect the overall environment while 63% did not believe so and 20% were unsure.

Education and awareness efforts on biodiversity by EWS (WWF-UAE)

5.5.3 Save the Ghaf Tree Campaign

The campaign objectives were raising public awareness about the values of ghaf (by raising the profile of the tree); promoting conservation work and partnership between sponsors Al Fahim and EWS-WWF; and providing evidence of relevance of ghaf tree conservation to UAE decision makers and recommendations to recognise ghaf as UAE's natural treasure.

The public profile of the tree was raised via an interactive save ghaf tree website that enabled plantations in a virtual garden and provided information about the ghaf. In addition, flyers, emails, direct mail, posters, advertisements, banners and icons on business (AMEInfo) website were developed and released; press conference,

press releases, radio talks, features, presentations at various forums including universities organized; a ghaf competition for students and general public (photo, picture, tale) held. The campaign culminated in the planting of ghaf saplings by EWS-WWF, their Corporate Club members in collaboration with Forestry Department Al Ain and National Avian Research Center (EAD Environment Agency – Abu Dhabi) in premises of the Avian Center, Sweihan.

Any account of the ghaf tree campaign cannot be complete without mention of a number of unplanned successes, for example, the 4th Abu Dhabi Classical Music Festival (April 2007) that was dedicated to ghaf conservation, free advertisement space in several popular periodicals, and HH Sheikha Fatima's personal interest in the campaign for ghaf and other desert trees. These apart, The Motor Town (community of off-roaders) conducted a ghaf survey and map, Abu Dhabi Men's College made a ghaf film and several blogs appeared on the internet!

5.5.4 Awareness and Education efforts with marine endangered species

The Biodiversity Management – Marine Sector and Environmental Awareness Sector of the Environment Agency have been involved with awareness efforts on marine endangered species, with particular emphasis on the turtles and the dugongs. Two species of turtles, the Hawksbill and the Green turtle are found in Abu Dhabi waters. The Hawksbill turtle forages and nests in the UAE waters while the green turtle only comes to forage in UAE waters. Both are on the IUCN Red-list. Green turtles are endangered but the Hawksbill is critically endangered. The Agency is undertaking research programs to understand turtle ecology, habitat, migration and conservation issues. Worldwide, sea turtles are threatened by habitat destruction, including loss of foraging and nesting habitats, hunting for meat (banned under law now) and poaching of eggs.

A very vibrant dugong and marine endangered species awareness program is underway in collaboration (and funding) with TOTAL in Abu Dhabi. As part of the conservation project, definite allotment in terms of finance as well as time has been put into the three-year project which started in 2004. Marine Sector rates this issue as highly important due to the fact that the awareness amongst stakeholders can minimize the common causes of mortality in dugongs (suffocation in fishing nets and boat hits) and loss and degradation of their foraging areas due to human activities, including coastal developments.



Picture 5.13 Awareness program for teachers on Marine endangered species

The target audiences with whom the awareness programs are to be undertaken are:

- Fishermen
- Island Managers/Labourers
- Oil field staff
- Government Agencies- Municipalities, marine police, coast guard
- Island inhabitants
- Schools- Teachers/ students and general public.

Efforts done so far include :

- Presentation on marine endangered species with particular reference to dugongs with the environment educators forum hosted by the public awareness material produced such as t-shirts, caps etc
- One to one discussions with fishermen and offshore island managers
- The topic of the presentation and or the discussions with various targeted audience has been the role of dugongs in the marine ecosystems and the need to conserve them and their foraging habitat - sea grass

Awareness efforts in process

- Intensive and focused and structured public awareness campaign in 2006
- Visiting all the islands in Abu Dhabi Emirate, meeting with all the stakeholders and stressing on the need for their cooperation to help with conservation efforts and forming partnerships
- Presentation and dissemination of resource materials and public awareness materials

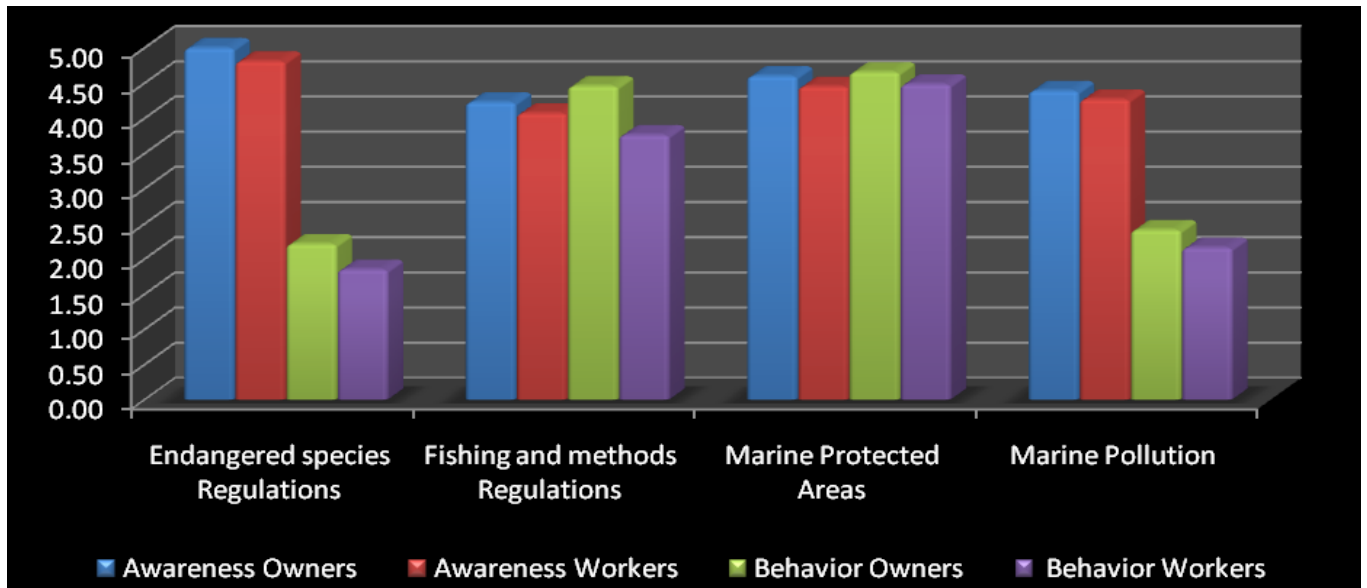
Limitations to awareness process

- Need frequent visits to the islands which impose a logistical problem as tasks are too many
- Organizing presentations for the island managers and residents again poses logistical problems such as the question of when and where
- Need for more multilingual communicators - fishermen are mainly labourers and need to be addressed in their own language

Awareness efforts undertaken for fish resources

Protection of marine resources with specific reference to fisheries has been one of the main strategic actions undertaken by the agency. To this effect, the Biodiversity Management – Marine Sector (BM-MS) of the Agency considers promoting awareness as one of the most important actions to be undertaken for the protection of fish resources. The target groups outlined for fisheries awareness are outlined as follows:

- Public
- Government/non-government organization
- Scientists
- Fisheries cooperatives
- Abu Dhabi Fisheries committee



BM-MS has been targeting the groups listed above mainly thorough presentations and discussions on important issues of fisheries management. The efforts have been annual with some target groups and sporadic with others. As the Ministry of Agriculture and Fisheries (now Ministry of Environment and Water) is also one of the main implementing agencies, they too have been involved with awareness issues. The Emirates Diving Association too has been active with awareness on these issues.

The efforts of reaching out can be termed as partially successful, but more needs to be done. As the main fishermen are daily wage earners, they need to be targeted on a more regular basis. So far they have been reached out through the boat owners.

Limitations on awareness with fishermen have been due to the language as most of them are paid labourers and expatriates and they do not speak the native tongue and even most of them are not literate.

Fishermen have been targeted on promoting sound fishing methods, knowledge of marine endangered species and marine debris etc through talks and presentations. These talks and awareness measures have been carried on in different languages such as Urdu, Hindi, and Malayalam besides in native Arabic for boat owners. The survey conducted to assess their level of awareness revealed the following. The responses to the questions were rated on a scale of 0-5 with 0 for no awareness to weight age of 5 given for the best response and maximum level of awareness.

Fishing labourers who do the regular fishing fared with low awareness on marine debris compared to boat owners but had more level of awareness on fishing methods and regulations as perhaps they do the most fishing. Similarly they also had higher level of awareness on marine protected areas. The boat owners fared high on awareness about endangered species. Most fishermen agreed that regulations protect fishes however only 22% of them agreed that regulations help them too in the long run. Almost all of them were willing to provide information to authorities on citing dead or endangered animals. Most cited oil, petrol, followed by waste and dirt as main marine pollutants.

Questions asked to assess level of awareness on adverse impact on overfishing of marine species to the environment in general and also to other fishes revealed that most of the respondents had a particularly good awareness on various bad impact of overfishing on marine life as well as environment, and they were also aware of endangered species as well. Dolphins and sharks were cited as the most endangered by them.



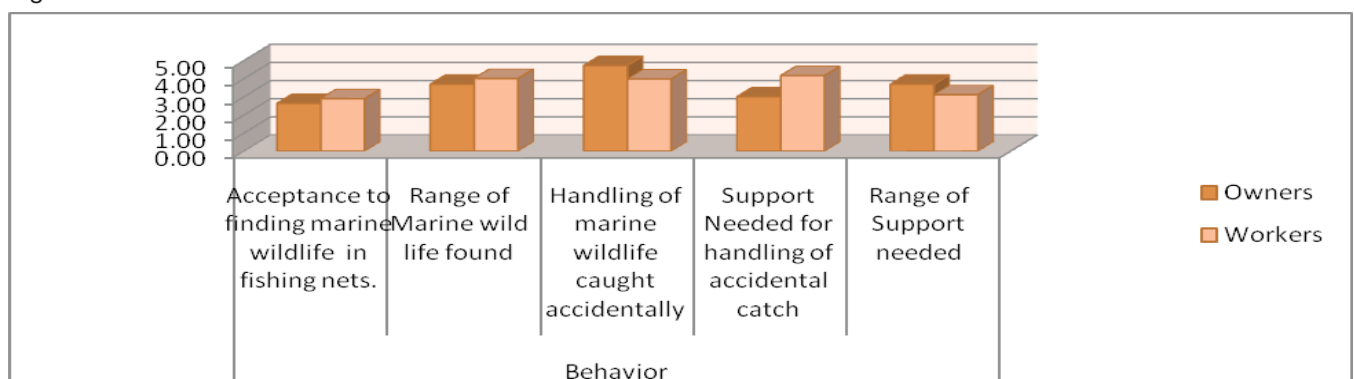
When boat owners and fishermen workers were asked on questions related to their knowledge and behavior about what happened with accidental catch of wildlife in fishing nets. Nearly 63% responded that they accidentally caught wildlife such as turtles and dolphins on their fishing nets. All of them reiterated that they release these wildlife once they are caught in the net and 95% responded that this damages their fishing nets. Most of the fishermen workers felt that government should aid them in these conditions.

The above results reveal a fairly high degree of awareness and also to a certain extent appropriate behavior patterns in some issues specially on compliance with marine protected areas or fishing regulations, this could be probably because of laws and penalties associated with it, on the other hand where voluntary control needed to be enforced specially in issue such as marine pollution or in case of fishing endangered species issues there seems to be low behavior pattern. This gives the indication that may be the method of awareness done so far needs to be changed to enunciate a behavior change. Also, revealed is a need for conducting a sound socio-economic survey for the fishermen and revise or update existing rules and regulations if needed.

5.6 EFFECTIVENESS OF AWARENESS AND EDUCATIONAL PROGRAMS

Most of the above efforts in environmental awareness and education have been professionally run and quite effective though for a short period of time. Some of these efforts have had an extremely high profile and been exemplary. However, follow up on the issue has often been lacking. There is a perception from the general public that 'we have concluded a particular environmental topic, so move on to the next one'. This is obviously not the intention of the organizers of these events. Unfortunately, it remains one of the outcomes.

A further point which should not be underestimated is the wide variety of languages spoken within the UAE and the different ethnic mix and cultures. This often means that it is difficult to get the message across equally effectively to all concerned parties. Furthermore, a method which will work extremely well with one ethnic group may be less successful with another. This multi-ethnic mix also makes the production of publications more difficult, time-consuming and costly.



Lastly, the Environmental Awareness and Behavior Survey EAD undertook in 2008 indicated that, in general, biodiversity had the most consistent behavior out of the environmental themes evaluated. This suggests that as people become more aware of biodiversity issues, they are likely to act and adjust their behavior to be more responsive to biodiversity issues. As part of the new EAD Strategy, efforts at conducting a stakeholder's meeting on biodiversity was held to bring together all the concerned and relevant entities impacting and/or dealing with biodiversity issues at some level. It was clearly stated during this meeting that the need to have a more coordinated approach for education and awareness. In addition, the private sector came forward to express their willingness to participate in and promote biodiversity education among the public and future generations.

5.7 TARGET AUDIENCES YET TO BE ADDRESSED

As already stated, a wide variety of target audiences has been addressed on a myriad of environmental issues in the emirate. In fact, it is difficult to think of a target audience that has not been addressed at some time on some issue.

However, after careful study, some ideas seem worthy of further investigation:

1. Both topics and target audiences have been tackled in isolation. This will have to change to become more encompassing. A good example of this is the environmental awareness and education on fishery issues:
 - It is the UAE nationals that own the fishing boats
 - The fishermen themselves are often of Asian origin
 - The leisure fishermen are often expatriate Arabs and people from the Philippines
2. It is true that all these groups have been addressed at some time on marine and fishery issues. As all have a part to play in ensuring the protection of the marine environment. To be effective, a well coordinated awareness strategy has to be worked out. There has to be a greater fostering of a UAE identity and care for the environment by non-nationals. This is a very difficult issue, and one that cannot be successfully tackled overnight. At the moment, there is a sense of insecurity among many expatriates over how long they will be resident in the UAE. This uncertainty leads to a poor caring attitude, which is not beneficial to the environment.
3. The 'live for the moment' mentality is prevalent among many in the emirate. Sustainable living should be a high priority for any future environmental awareness and educational efforts. This idea cuts across many environmental issues and is one way of showing the environment as a whole, and not as a series of separate compartments. All future efforts have to be in a variety of languages and encompass different approaches to the same theme. An idea of collectiveness has to be fostered. This has often been lacking in the past.
4. Nationals are the future guardians of this emirate, and it is they who will have to take up the reigns of responsibility in the future. They should start by taking a lead in these efforts both within their communities and without.

6 POLLUTION



6.1 INTRODUCTION

The United Arab Emirates is a relatively new country. The first time visitor or tourist is only taken aback by the development and the modernity of this so called desert country. The wealth from oil has enabled development to take place at an almost unprecedented rate. Hand in hand with this development, has been the increase in population of both nationals and non-nationals. Yet, it is difficult for a resident or visitor to imagine that the clean and well-planned cities with their long and pristine stretches of beaches in this country are also prey to pollution. Driving in closed air conditioned cars and living in the cool comfort of air conditioned homes makes this prospect unthinkable. It is a sad fact that pollution of the land, sea and air has increased and has now reached levels which give rise to concern.

Air and marine pollution are of serious concerns within the emirate and environmental initiatives so far have concentrated within these two areas. Targets have been the concerned audiences. This is not to undermine the significance of land pollution, it is equally important. However, with a vast subject like pollution, it seems wise to concentrate efforts on the areas that are of immediate concern.

6.2 AIR POLLUTION

Air pollution is usually defined as the presence of one or more chemicals in the atmosphere in sufficient quantities and duration so as to cause harm to all life forms, to materials or sufficient enough to alter our climate. The effects of air pollution range from the mere annoying to lethal. The real extent of effects of air pollution to human health in the emirate may be difficult to assess. However, this effect is likely to be real and significant.

There is a feeling among residents in the emirate that air pollution is new. This is not true. What is true is that it has increased in significance over the last four decades. As human activities and population have risen in the area, so have pollution levels which are so closely associated with these activities. Some activities which have caused air pollution in the emirate include:

- Gas flaring in oil fields (since the 90's the government has No Flare policy)
- Power plants for the generation of electricity
- Cars and trucks
- Construction activities.

Indoor pollutants have a special significance to the population. Being a hot country, most people spend the maximum amount of time indoors. It is believed that an average resident in the emirate spends about 70% of his/her time in indoor situations. This rises to over 90% in the hot summer months. As far as environment education and awareness is concerned, women feel very strongly about this and want to know the kinds of indoor pollutants in the emirate and the effects on them and their children. There is a considerable demand from women's associations and clubs to address these issues from environment educators.

One of the main reasons why the effects of indoor pollutants can get exacerbated is due to the fact that a) most of the population lives in closed high rise buildings, b) due to the climatic conditions ACs are constantly switched on and people do not have the habit of opening windows to let in fresh air. The other factor contributing to this is that most of the floors in flats are carpeted. Both these factors increase dust mites and bugs. In fact it is a common feature in most of the schools to find that young pupils are either asthmatic or suffer from skin allergies. This is of major concern to people but has not been much addressed in awareness programs so far.

6.3 EFFORTS SO FAR IN ENVIRONMENTAL EDUCATION IN AIR POLLUTION

6.3.1 Awareness programs by EAD

Educational efforts on air pollution have been restricted to students so far and on a few occasions with women and industrial employees. The efforts with students have been more structured. Under the focused awareness program conducted by the Agency's education department, classroom presentations are conducted on all kinds of pollution. These programs have so far covered only middle school students.

Concepts communicated:

- Pollution - meaning and definition
- Kinds of pollution
 - Air
 - Water
 - Land

- Causes of pollution
- Status in the emirate
- Efforts taken by the government
- How can individuals contribute?

Pollution education has so far been approached mainly as a classroom program, through a power Powerpoint and has been followed by an interactive classroom activity for students commensurate with their age to disseminate pollution concepts.

Awareness with industrial employees and women Presentations have been made on saving electricity with industrial employees and women. A campaign held for the oil sector in Ruwais (2004) and Mirfa (2005) from the western region by the Agency targeted more than 2000 children, 150 women and industrial employees. It focused on reducing their energy footprint to help save energy and help reduce pollution. Though the campaign was on saving electricity, the message of pollution got conveyed as well. Oil companies regularly target their employees and their families on issues of environment through their HSE (Health, Safety and Environment) departments.

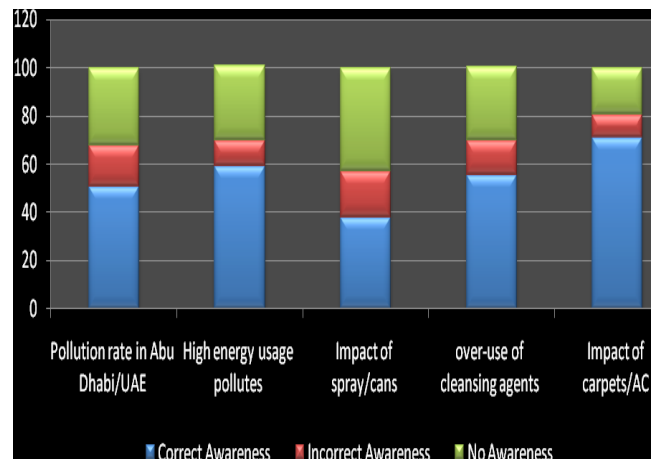
Presentations have also been made with women at ladies' clubs or associations on indoor pollutants and their harmful effects. The numbers of presentations conducted are too minimal to have had made a major impact.

Compared to other issues, EAD has not tackled disseminating education and awareness on pollution at the same level. There is, however, much to be done. In the government and private sector stakeholders meetings conducted on management and protection of air quality in the Emirate, EAD's networks and education and awareness capabilities were recognized and the need for collaboration on this also was expressed.

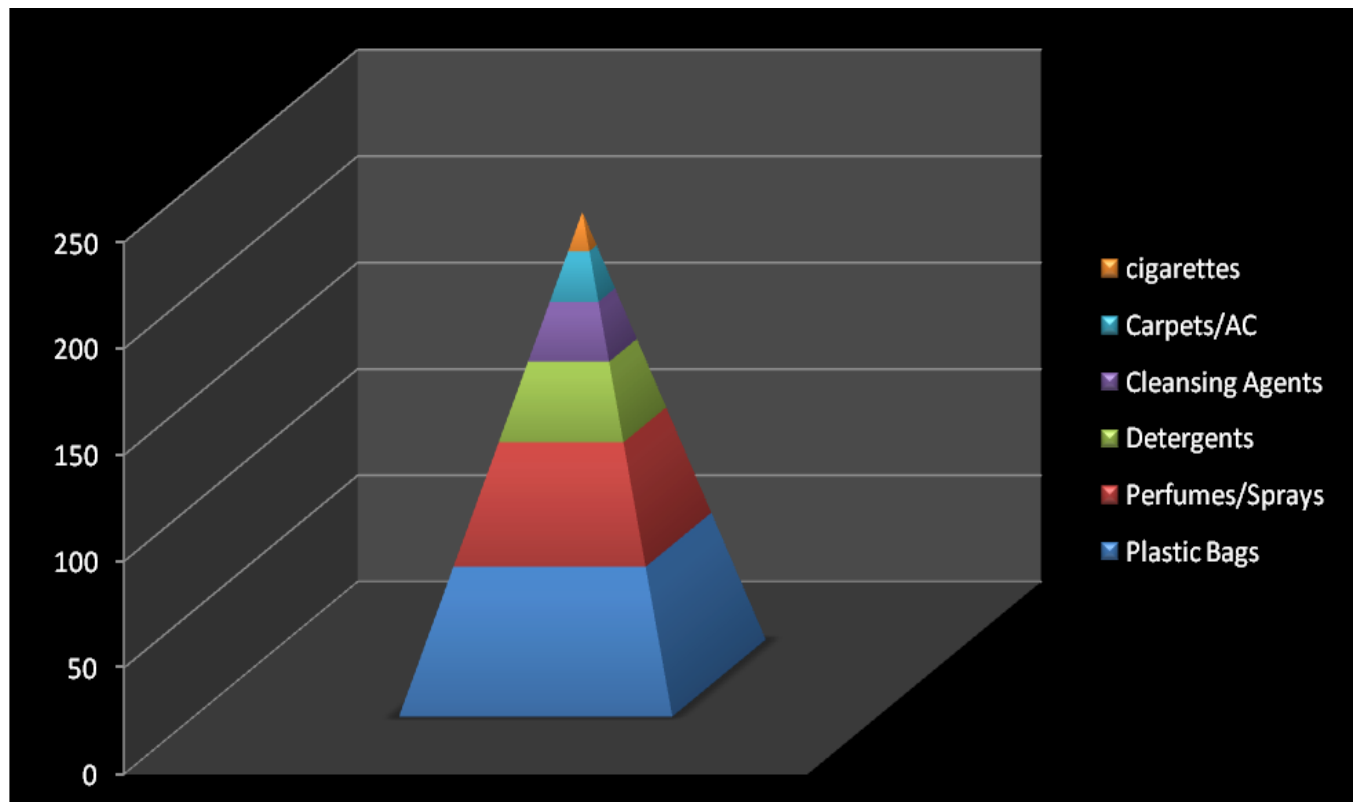
- Also the survey conducted to assess the extent of awareness pollution featured as the most favourite issue amongst all respondents. Pollution was the term widely used to talk about any environmental issue by the people. Again keeping with how they perceived pollution most of also cited Pollution as the major environmental issue facing the Emirate today, it was the most talked about issue. Of the public sample surveyed level of awareness was 50.8% whereas level of appropriate behavior was 46.6%.

- High proportion of men 60% followed by teens and youth at 45% and lastly only 38% women believed that pollution rate in Abu Dhabi was high.
- About 15-20% did not find the pollution to be high while almost 40-45% were not sure.
- Nearly 70% of the respondents believed that use of carpet and AC can cause health problem with much higher proportion of Asians. Allergies followed by other problems like dust mites were most often mentioned health issues facing the sample surveyed.
- The behavior and awareness on energy seem to be impacted mainly by nationality, gender as well as socio-economic class and location.
- Plastic bags were perceived by all as the most polluting agent followed by sprays, detergents, cleansing agents, carpets/AC and cigarettes
- Overall awareness of pollution and its common household agents is about 55-60%

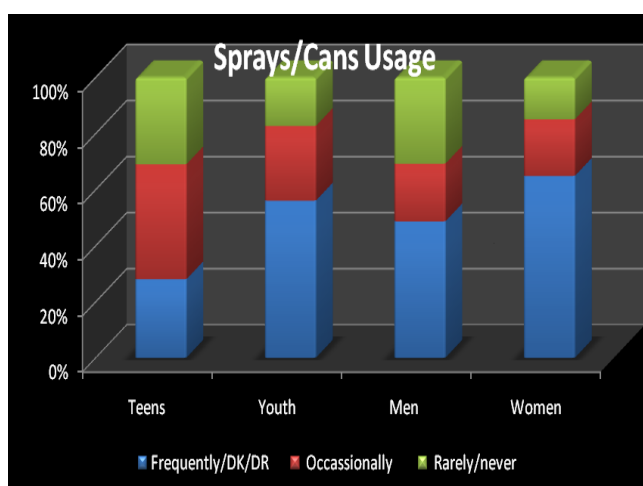
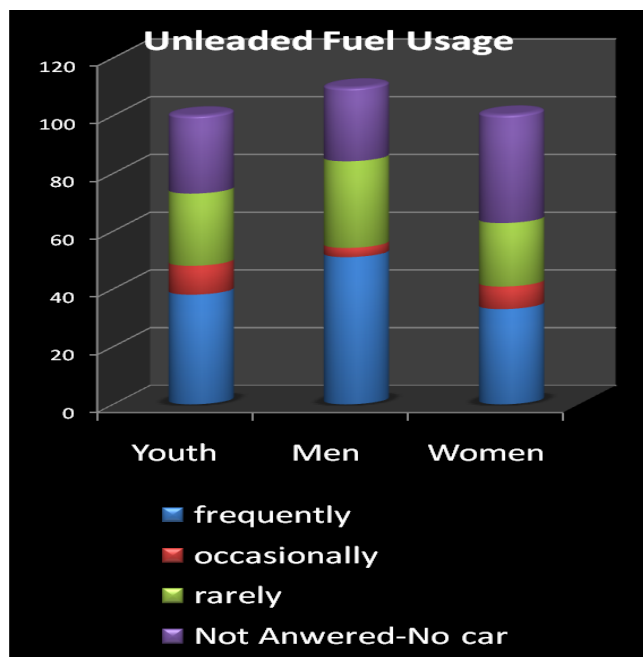
Percentage level of awareness on pollution and polluting agents among the sample surveyed in the Emirate.



Frequently mentioned polluting agents by the sample surveyed.



Below are the graph that signifies the disconnect between perceived awareness and appropriate behavior. While sprays were perceived as the second most polluting agent, people did not necessarily curb their usage of it in their daily practice. Similarly while many believed that energy use also leads to pollution, use of unleaded fuel was not a common practice with all of the target groups.



6.3.2 Awareness efforts undertaken by the Emirates Heritage Club

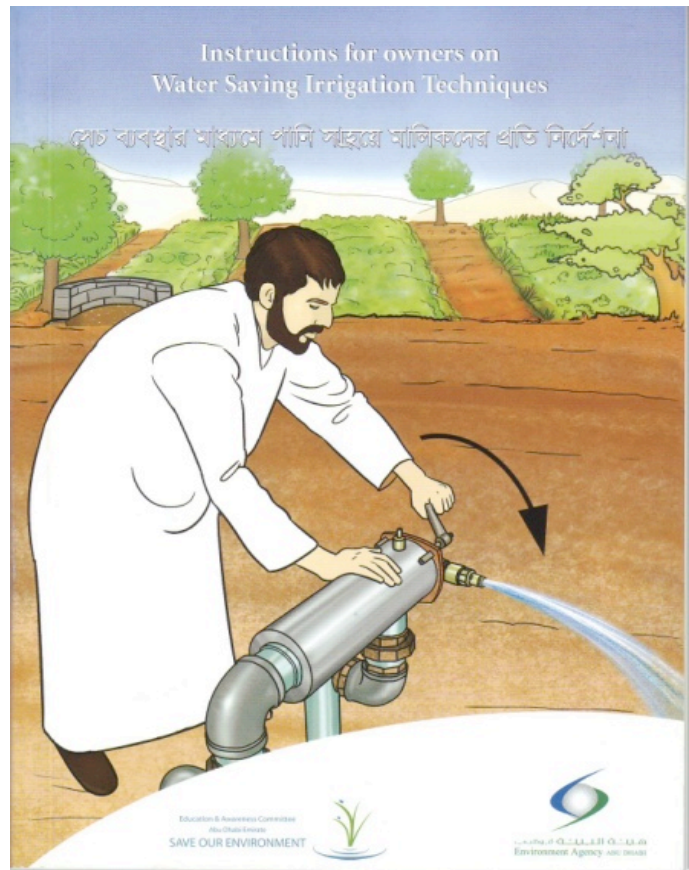
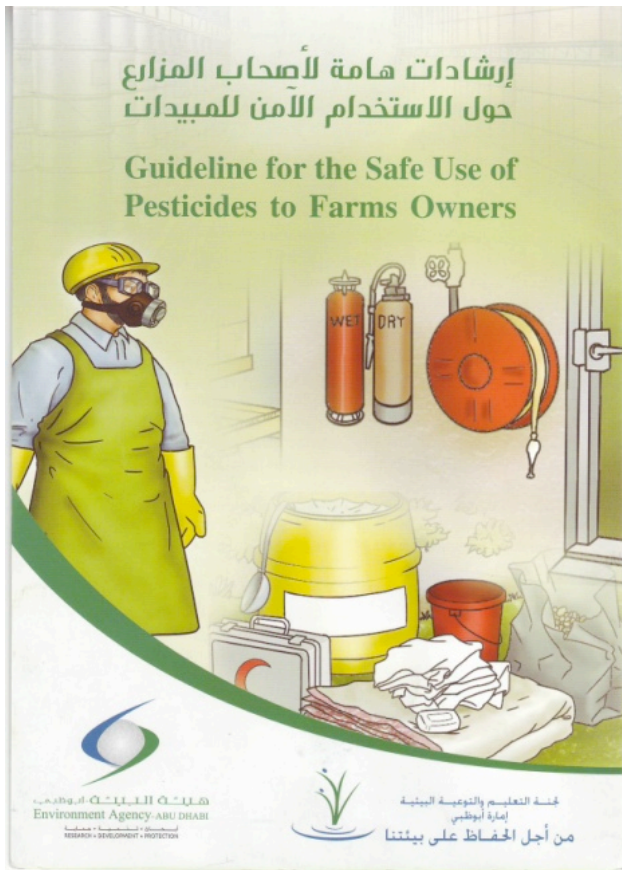
The Department of Environmental Research from the Emirates Heritage Club had undertaken efforts to raise awareness on air pollution by producing brochures on the influence of pesticides on people. They had also conducted seminars and published brochures and posters on the Ozone Layer for school students. They have also prepared environment calendar which addresses air pollution, smoking, ozone layer, solid waste, management and endangered species. In addition they have also addressed noise pollution by producing a brochure for public dissemination.



Picture 5.13 Awareness with Women as part of Industrial camp Oil field area

6.3.3 Awareness efforts by Ministry of Agriculture and Fisheries (now Ministry of Environment and Water)

To minimize the effect of high pesticide use and the resultant pollution, the Ministry of Agriculture and Fisheries issues the necessary legislation for directing the use and handling of pesticide inside the UAE and provides guidance to technicians and engineers in charge of distributing the pesticide. As mentioned before in the water section, currently there is a program underway by EAD, MAF (now Ministry of Environment and Water) and UAE University.



One of the limitations of Environmental Education efforts on pollution with students is as is the case in other countries, that students and the public are encouraged to use public mass transport systems like buses or trams etc. Here in the emirate, the main mode of public transport is the taxi and more so private cars; it is difficult to convince the students to adopt environmentally friendly practices to reduce pollution when there is no such facility provided by the government. With the high standards of living in the emirate, most of the students prefer coming to school by their cars. This is especially true of students pursuing higher education. The International Conference on Sustainable Transportation held by the Agency did address some of these questions and targeted professionals, scientists and educators. It is to be mentioned here that since 2008, the government of Abu Dhabi has introduced the public transportation system. Buses have started running in the city with more and more commuters adapting to this mode of travel.

The other main source of air pollution in the emirate is the generation of electricity. Already the emirate has one of the highest per capita consumption of energy, which is somewhat understandable given the nature of weather conditions prevailing in the Emirate, nevertheless in the environmental sense it is a cause of concern. This amount is very likely to increase significantly as the human population increases and as lifestyles demand more and more electricity for use. It is obvious that the public must be educated in the use and abuse of electricity and the consequences on the environment and on its population. A major campaign is needed countrywide, but targeted particularly at urban dwellers. EAD has also engaged in energy education by further engaging the public on climate change issues as part of its new strategy. See also previous sections on efforts by EAD.

6.4 MARINE POLLUTION

Water in any form is an important resource. Dwindling groundwater reserves in the emirate, increasing saline intrusion in the ground water and pollution of underground water by increased use of fertilizers and

pesticides are a serious problem in the emirate. The main target population for this would be the landowners and the farmers. The awareness programs intended for farmers have already been discussed in the water section.

With its 420 km length of coastline, preserving the marine environment is a major issue in the emirate. Its well populated coastline imposes a lot of importance on environmental education efforts for marine pollution. Targeted audiences for this can be easily identified and simple actions can be effective.

The world's seas and oceans have been historically used as a dumping ground for its wastes. While it is true that oceans can dilute, disperse and degrade large amounts of raw sewage, oil and some types of degradable industrial waste, especially in deep water areas but this cannot continue forever.

Areas along coasts, especially tidal flats, backwater areas, sea grass habitats, mangroves and coral reefs, may be hugely affected by inputs of wastes and pollutants into the Gulf in the emirates. This is not surprising as the majority of the emirate's population live on or very near the coast. Marine debris is a serious issue in the emirate.

6.4.1 Environmental Awareness and Education on Marine Pollution in the UAE

Pollution of underground water has been dealt with in the section on water.

Awareness about marine pollution

Marine pollution as an issue has been very often addressed through clean up campaigns. One of the major recreations for all targeted groups in Abu Dhabi is regular beach visits. Herein lays the problem of littering and beach debris.

clean up campaigns

clean up campaigns highlighting the role of marine debris and its effects have been regularly conducted by almost all disseminating agencies. clean up campaigns also prove successful and are able to target a wide variety of audience right from students to the general public. Of all the methods, this seems to elicit the maximum response from all. Right from the inception of environment education and awareness programs, clean up campaigns have been

a regular feature of almost all the NGO efforts. The oil companies have been conducting clean up campaigns as a regular part of their annual HSE week awareness right from the beginning.



Picture 6.2 clean up organized by ADEG

The Abu Dhabi Environment Group was perhaps the first NGO in Abu Dhabi emirate to have organized a clean up to reach out to the community with regard to marine pollution. Among the significant campaigns conducted by the ADEG include the 'blue plastic bag awareness campaign'- School students and the public were involved in the collection of blue plastic bags with an effort to raise awareness about the effects of the thin blue plastic bag flying into the ocean and causing turtles to choke on them besides creating harmful marine debris.

Island Cleanup - ADEG helped organize a major clean up of islands in and around Abu Dhabi in the early '90s. Almost all hotels pitched in with this effort and the Intercontinental Hotel took the lead.



Picture 6.2 clean up organized by EEG

The EEG regularly conducts cleanup campaigns for more than a decade now. EEG has put in tremendous efforts to harness tens of thousands of students, the corporate sector and the public to take part in massive efforts to participate in Cleanup the World and Cleanup the UAE programs. In this program, they have also formed a partnership with many other governmental organizations.

EAD encourages students and schools to regularly conduct cleanup campaigns and also conducts cleanup campaigns to commemorate important occasion like the World cleanup Day. EAD on its own and also in partnership with ESNAAD and EDA (Emirates Diving Association) had organized a yearlong Marine cleanup campaign of Abu Dhabi and its islands in 2005. Besides these, on an average, at least 3-4 cleanup programs are conducted with different schools. These cleanup campaigns have involved students, public and professionals alike. AD has also conducted presentations with fishermen and boat owners in different languages on the issue of marine debris. Every year, on the occasion of World cleanup Day, it has tried to involve fishermen along with students to cleanup the shore debris and the marine debris.



Picture 6.4 cleanup Arabia organized by - EAD/ESNAAD/EDA



Picture 6.4 cleanup Arabia organized by - EAD/ESNAAD/EDA

On the occasion of World cleanup Day, EAD targeted women on the issue of keeping the beaches clean at the Ladies Club. Also, in 2008, EAD conducted year round focused awareness campaigns on marine debris by implementing seven cleanup drives. In addition, presentations and resource materials to fishermen and other stakeholders on this issue were also given (Also see Biodiversity section). As mentioned before seven cleanup campaigns covering all along the coast of Abu Dhabi from Taweelah to Sila, was conducted as a part of this Marine Debris Awareness Campaign during 2008 alone. During these cleanups 39,493 Kg of Debris was collected with 1585 volunteers. During the same year, EAD also as usual gave its yearly support to cleanup Arabia organized by Emirates Diving association and cleanup UAE organized by EEG. Besides these the Agency has always provided support to any private, government or any civil organizations interested in conducting cleanups.

As a part of its annual environment competition held every year, 2004-2005 saw the inclusion of the UN theme of the year, 'Wanted Seas Dead or Alive' which centered around marine pollution. Competitions were held for all categories of students, right from KG to senior school. The competitions ranged from writing short stories on marine pollution to art work on keeping the seas clean for the KGs to conducting research on the public use of beaches by the seniors. This competition targeted 1400 students from all over the emirate. The Emirates Heritage Club has also conducted workshops for students on marine pollution.

As mentioned above in the underwater cleanup campaign conducted by the Emirates Diving Association (EDA) and supported by EAD, more than 147 divers and volunteers cleared the Abu Dhabi Corniche to Mina Zayed of litter and marine debris. This campaign was part of the wider cleanup Arabia campaign and covered 1.8 km on land and 8 km underwater. Government organizations, private companies and schools participated in the clean-up.

In the Environmental Awareness and Behavior Survey EAD conducted in 2008, pollution was most often mentioned as an environmental problem across all segments. Pollution related behavior ranked highest among the respondents meaning that people were generally most active when it came to pollution related issues. However, awareness was second to energy related issues.

7 EDUCATIONAL AWARENESS ON GLOBAL ISSUES



7.1 INTRODUCTION

With the expansion of the area, scale, and kind of human activities all over the world, climate change, the ozone layer depletion and many other global environmental problems have come to the fore. All these global issues have posed a serious threat to human beings. These problems are difficult for any one country to handle alone and international cooperation is necessary in order to have any success at all at solving these problems.

What is also becoming increasingly apparent is the interconnected nature of many of these environmental problems. Many of the world's most serious environmental threats transcend national borders. Global warming, pollution from power plants and cars in the United States, increase the risk of floods in Europe and drought in Asia.

Today, the world's major economic, social, environmental problems are systemic in nature and seem to be linked to a common cause stemming from a mechanistic view of the world, not a holistic one as mentioned by Fritjof Capra, systems thinker and founding Director of Center of Eco Literacy, Berkeley, California in his book 'The Turning Point'. Hence, it has become imperative to orient the younger generation about the impact of their and society's actions on themselves, their countries and also the world.

7.2 PROMOTING AWARENESS ABOUT GLOBAL ISSUES

Educational and awareness efforts to promote global issues have mainly been pursued through the environment clubs established in schools. The Environment Agency - Abu Dhabi supports and helps establish environmental clubs in schools and institutions of higher education as a part of its non-formal educational and awareness strategy. It is hoped that these clubs not only enhance creativity and organizational ability to tackle environmental issues amongst students, but also become the forum through which global environmental issues could be taken up.

It is noteworthy to mention here that the first of the environmental clubs in the UAE and also in the Abu Dhabi emirate was the Abu Dhabi Indian School's club, where a lively intra school debate on global environmental issues for senior school students has been organized every year for the past 17 years (1990-2007). Students pit their wits against each other, debating on issues ranging from whether the international conventions so far have been effective in protecting the environment or whether achieving sustainable development is a utopian dream.

Another significant attempt at tackling global environmental issues has been made by the Higher Colleges of Technology. All the HCTs have integrated global awareness centrally as a major requirement for their graduate outcome course. The HCTs within each emirate design and interpret global awareness within their course. It is commendable and worthy of emulation by other educational systems. An excellent online example could be quoted from foundation Department of the Dubai Women's College program entitled, 'The Environment - Who Cares? - An Awareness Week Web Quest'. This quest covers five key concepts in thinking about the global environment. They are:

- Key Concept 1: Endangered Species
- Key Concept 2: Population Growth
- Key Concept 3: Pollution
- Key Concept 4: Energy Use and Climate Change
- Key Concept 5: Recycling

This can be viewed on the following web site hosted by the college:

<http://www.dwc.hct.ac.ae/fnd/english/webquest/environment-quest-mark.shtml>

Some global awareness principals covered via the HCT include:

3.1	Analyze given global issues for their impact on local issues, evaluating their causes and effects.
3.2	Recognize the influence of culture and context on the achievement of specific tasks, and demonstrate the ability to address these in performing specific tasks.
3.3	Use historical tasks as a part determinant of solution to given contemporary problems.
3.4	Generate an informed response to a global issue.



Picture 7.1 Promoting Awareness on Global Issues

The HCT Al Ain Women's quest for tackling the global biodiversity issue and contributing positively by their Save the Tiger campaign held on December 1st 2004. Under this program, the Foundation year students organized a walk, designed publicity posters to raise awareness about the plight of the tiger, produced and sold badges/bookmarks for the cause.

On December 1st, 160 students (six sections from Foundations 2 from CD) walked to the zoo and followed a tiger trail looking for eight 'lost' tigers containing information and answering quiz questions on tigers, and saw educational videos in the Education Room.

An impressive 10,000 AED was raised by the students and given to the WWF to buy fire-fighting equipment to help protect the forests of the Bengal tiger and also for training officers in tiger-monitoring and anti-poaching. The Emirates Environment Group (EEG) too has been very active in organizing community lectures inviting to discuss issues such as global warming, climate change, desertification and other global issues. Though the percentage of residents from Abu Dhabi attending these lectures organized in Dubai is minimal, nevertheless they have been putting in great efforts to encourage people to attend. The EEG has also been very active in organizing workshops and public speaking contests for school children all over the UAE and a sizeable number of students from the Abu Dhabi emirate participate. EEG also travels to Abu Dhabi and the western region to give lectures and presentations to schools, corporate and public offices as a part of its services.

7.3 AWARENESS ABOUT INTERNATIONAL CONVENTIONS AND THE UAE'S COMMITMENTS

There have been many international conventions designed to control and reduce the risk of a variety of international problems. However, many citizens of the United Arab Emirates seem unaware of the conventions or the conventions the UAE has pledged to uphold. Environmental education within the emirate at least must rectify this situation.

7.4 MAJOR INTERNATIONAL ENVIRONMENTAL CONVENTIONS

There are a multitude of international environmental conventions. Some of the most important include:

- The UN Framework Convention on Climate Change (UNFCC): It was signed by 155 states and the

European Community in June 1992 at the United Nations Conference on Environment and Development (UNCED). The United Arab Emirates is a party to this convention. The objectives of this convention are to stabilize the density of greenhouse gases, and to reduce, or limit the emissions of these gases.

- The Convention on Wetlands of International Importance, especially as Waterfowl Habitat, (1971), (Ramsar Convention): This was the first global agreement to address the conservation of a particular habitat. Most of the waterfowl that inhabit marshes or swamps are migratory birds. International cooperation to preserve marsh lands has been recognized as necessary in order to protect these species.
- The 1973 Convention in the International Trade in Endangered Species (CITES) was established to limit the trade in endangered species across the world.
- The 1992 Convention on Biological Diversity (1992 Biodiversity Convention) was negotiated under the auspices of the UNEP, and signed by 153 states and the European Community at UNCED in June 1992. It goes beyond CITES by establishing objectives for the comprehensive preservation of biological diversity, reflecting objectives of the 1980 World Conservation Strategy. The UAE is a party to this agreement.
- The 1985 Vienna Convention for the Protection of the Ozone Layer was negotiated over five years under the auspices of the UNEP. It was the first convention to address a global atmospheric issue and has attracted widespread support from all industrialized nations, and a very large number of developing countries. It was established to protect human health and the environment against adverse effects resulting or likely to result from human activities which modify or are likely to modify the ozone layer.
- The Kyoto Protocol to the United Nations Framework Convention on Climate Change is an important, international treaty on climate change. It was opened for signature in December 1997, but came into force only in February 2005. 161 countries had signed this treaty, including the United Arab Emirates. Countries that sign this protocol are committed to reducing their emissions of carbon dioxide and five other greenhouse gases, or engage in emissions trading, if they maintain, or increase emissions, of these gases.
- The United Nations Convention to Combat

Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa, was signed in 1994. As the title states, it tries to slow down the pace of desertification and stop it where possible. The United Arab Emirates has a special interest in this convention, due to the desertification that is currently taking place here and its effect on both the land and its people.

All the above international conventions are truly international in scope and can only succeed with the willing cooperation of many partners across the world. Many people in the UAE seem unaware of the importance of these agreements and how failure in these areas could seriously affect their daily lives. While a systematic and structured awareness program tackling the international conventions and treaties have not been in place in the Abu Dhabi emirate, some efforts have however been made in some of the issues such as the ozone protection issue and awareness regarding the trade in endangered species in the emirate.

Efforts to promote awareness about the ozone issue by the different disseminating agencies are as follows:

Environment Agency - Abu Dhabi has so far targeted students, the general public and industrial employees. Students, mainly from the secondary and senior schools, have been made aware through classroom presentations.

Primary students have also been addressed to a certain extent.

Concepts communicated to the senior students on the issue in the presentations included:

- Ozone as an atmospheric constituent
- Importance of the ozone layer
- Link between ozone depletion and ODS (ozone depleting substances such as the CFC)
- Sources of ODS - Present consumptive pattern of substances using ODS
- Impact on humans, plants and animal life
- Steps taken so far by the UAE government and globally
- Their contribution to the protection efforts

The same presentation in more depth is also offered to higher educational establishments. These programs are offered throughout the academic session. Normally schools book in advance for this case specific presentation.

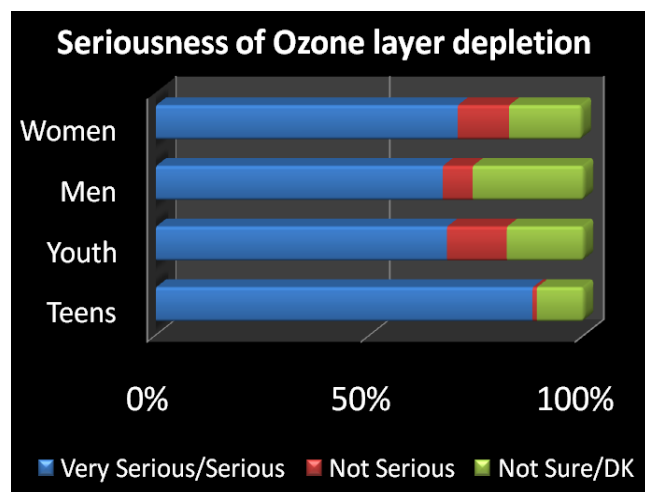
Commemoration of Ozone Protection Day

The Environment Agency Abu Dhabi has been regularly commemorating the Ozone Protection Day with the public in the following ways:

- Each year, press releases are given to help raise public awareness on the issue.
- Regular commemoration of the day started in the year 2001 when the Education and Awareness division of the agency helped organize a march by the students along the Corniche. The students talked to the public about the issue and helped distribute awareness leaflets to the public.
- In the year 2002, a survey was conducted near the popular malls for the general public through a questionnaire. The survey covered approximately 150 participants. It was conducted with the help of senior students to give them a sense of participation in the drive to promote awareness among the public. The analysis of the survey revealed that the public was not really aware about the adverse impacts of the depletion of ozone layer on human health; it also revealed that the public felt that more awareness drives like these should be conducted on a regular basis on all environmental issues.
- Ozone awareness activities were held with schools in 2003 and 2004.
- In 2005, the agency targeted more than 4,000 students by showing them an animated video film on this issue released by the UN besides targeting 60 industrial employees on the issue through presentations.
- In 2006, 2007 and 2008, programs at public malls and other public areas have been organized where the public was made aware of alternatives available in products that use ODS (Ozone Depleting Substances) by EAD officers. This was in addition to presentations to different target groups, and assembly speeches in schools on this issue.

In the survey conducted by EAD to assess the extent of awareness amongst its population, almost nearly 74% of

the respondents felt that ozone depletion is a serious issue. In terms of seriousness, the ozone issue even scored higher than climate change.



Arab expatriates, along with westerners, were more particular about taking required care of self and family from impact of UV rays. 50% of the sample surveyed felt that skin cancer was the most associated disease due to ozone layer depletion, whereas 20% felt an increase in cataract development was the most important consequence on humans due to ozone depletion.

Educational and awareness efforts by others include presentations and lectures by experts on the issue by the Emirates Heritage Club and the EEG for students and the general public.

Efforts to spread awareness to reduce trade in endangered species

The Federal Environment Agency, the Environment Agency-Abu Dhabi, Ministry of Environment and Water and the EWS (WWF-UAE) have put in great efforts to curb trade in endangered species. The public has been systematically targeted through the press and media on a regular basis to promote awareness about CITES. Other targeted groups include educators and students through presentations, pet shop owners through notices and visits by officials. Training sessions have been conducted for custom officials at transport check points. It is to be noted here that now all awareness efforts from the FEA is now being tackled by Ministry of Environment and water.

Special efforts have been undertaken to curb the trade in endangered species such as the falcon, in lieu of the fact that the UAE has had a strong tradition of falconry.

The Government tries to promote the use of captive bred falcons for hunting purposes, and all falcon owners are issued special falcon passports to take their captive bred falcons for hunting abroad. Awareness about the rules and regulations, and the need for falcon passports are conveyed effectively to all the falconers through talks, discussions, brochures, posters, press releases and the media.

The survey conducted with CITES pet shop traders revealed that the level of awareness among the sample respondents was 63.9%; however, the level of behavior was comparatively low at 48.1%. The Falconers rated 63.9% in awareness and 48.3% in behavior. Clearly, one can see a disconnect between awareness and behavior. The survey also clearly brought out that whenever there were rules and regulations in place, the level of awareness was high and behavior was motivated by just doing the needed actions as much as the rules required. Thus there is a need to continue with awareness efforts in a sustained manner to get a change in everyday mindsets. (see biodiversity for more on survey result on CITES)

Climate change

Scientific data indicates that the earth has got warmer over the last 100 years. Not only have global average temperatures increased, but glaciers have retreated and the mean sea level has risen. The general consensus of opinion is that this has been caused by emissions of greenhouse gases, most notably, carbon monoxide. If this is true, then even more dramatic changes could be in store for us in the future. It would seem wise to try and curb the continued rise in these greenhouse emissions.

A temperature change of a few degrees worldwide may not seem a lot, but it may be enough to alter the range of natural habitats and affect the distribution of the species within them. It would also seem likely to cause changes in precipitation patterns. Rising sea levels caused by melting glaciers and thermally expanding sea water could cause a direct threat to coastal parts of the country (where the vast majority of the population resides). Under the best scenarios, these changes will occur gradually, but there is a risk of abrupt shifts in climate that could have catastrophic results, not only for plants and wildlife, but also for the global economy. In fact, a very significant fact that one must bear in mind is that 85% of the population and 90% of infrastructure of the UAE is located in low lying coastal areas. Depending upon the degree of ice melt in the Arctic and subsequent sea level rise, vast areas in UAE could be inundated.

Scientists are only just beginning to assess the potential impacts of global warming on human health. There are a variety of global health concerns, including heat stress and infectious diseases and increased incidence of certain waterborne and food-borne infections. The UAE would seem prone to all of these potential harmful effects of global warming. In view of the recent findings from the 5th IPCC about current climate change conditions, it is accepted that this is a serious threat to development, one which humans have contributed to. The formation of the Bali roadmap (UN Climate Change Conference), in which UAE participated, it is imperative that climate change be considered a most pressing issue. However, most knowledge regarding climate change still resides within scientists, technocrats and the government domain and more needs to be done to engage the general society in adapting to and militating against climate change. If climate change is the new reality that all humanity must face, then it is most urgent to engage and involve society in confronting this new reality.

Hence 'Engaging society on Climate Change' is one of the important initiatives for 2009-2013 strategic action plan for EAD. The main objectives of this initiative are three fold:

- Develop and design target specific resource materials for Education and Awareness on climate change for dissemination
- Promote energy efficiency and enhance education and awareness about renewable sources of energy through increased outreach
- Network with international partners to comply with locale specific global action

In 2008, EAD commissioned the Stockholm Environment Institute (SEI) to develop a climate change policy for the UAE. To develop such a policy, the SEI first had to conduct an impacts, vulnerability and adaptation study to better understand the potential threats climate change poses for the UAE. The analysis was conducted for coastal zones, dryland ecosystems and the coastal zone and the reports are currently in the process of being reviewed and published by EAD under separate cover. In addition to this, EAD conducted a multi-stakeholder meeting where representatives from both the public and private sectors were invited to comprehend possible climate Change impacts along with a proposed framework for developing a climate change policy for Abu Dhabi based on the these results. EAD invited stakeholder feedback to help guide the development of the policy, and at the time of this

writing, the climate change policy for Abu Dhabi was under development. It is important to note that the Government of Abu Dhabi has recognized climate change as a serious issue it must deal with and has taken steps to better address these issues. EAD in particular, along with other climate change work being conducted via EWS-WWF, has taken a leading role and has invited stakeholder feedback at various levels to better guide policy and regulation, while also building awareness via multi-stakeholder workshops.

In May 2008, EAD conducted a multi-stakeholder workshop for drafting an action plan to promote environment education and awareness on climate change issues that included representatives from nearly 43 public, private and NGO organizations and saw over 120 participants. The objective of the workshop was to discuss climate change issues, while engaging the stakeholders to adapt to climate change by enhancing efficient use of energy. A detailed target based action plan was drafted on education and awareness with all stakeholders as a result of this workshop. This action plan has been taken into consideration for preparing a climate change framework for the EAD.

To promote the use of renewable energy, The Environment Agency – Abu Dhabi and The Ministry of Energy from Germany launched a program entitled ‘World of Solar education and learning’ with schools in Abu Dhabi. This program was initiated in 2005 with a pilot phase with Emirates National School in Abu Dhabi starting in the academic session of year 2006. After the successful pilot run of the program teachers from other Government and private schools were trained to take the program further in the year 2008. During year 2008, 35 teachers were trained in 2 training workshop. The main objective of this educational effort was to help students get comprehensive knowledge about the technical, scientific, economic, social, local and global perspectives of using solar energy with particular reference to the Gulf Region. Interactive hands-on educational modules were designed and resource materials prepared around three units: (a) Solar power application; (b) Solar heat application; and (c) further renewables. The future plan is to train more teachers and take the program to more schools, integrate the modules into the curriculum and set up a solar education Center with all the educational resource materials that have been produced for this project.

In April 2006, the Abu Dhabi Emirate launched a bold initiative to embrace renewable and sustainable energy known as the ‘MASDAR Initiative’. The UAE is the first hydrocarbon nation to have taken such a step. MASDAR

is a non-profit independent entity established with the assistance of Massachusetts Institute of Technology (MIT). A component of the MASDAR initiative includes a graduate level scientific engineering institution offering Masters and PhD programs focused on education and research. The MIT is assisting MASDAR to emulate its own standards of excellence in Abu Dhabi by offering high calibre graduate education. It is also in the process of establishing a research network with universities and colleges all around the world including the UK, Japan, Canada, Germany and the US in hopes to initiate advanced scientific research in energy and sustainable technologies.

EAD has partnered with MASDAR on renewable energy education initiatives where the development of the Masdar City, which aims to build a zero-carbon footprint city habitable for 50,000 people in Abu Dhabi. MASDAR will become a central hub for the most innovative research and implementation of renewable energies and green technology.

The Agency is also collaborating with the EWS in their campaign to reduce energy use through their energy sustainability campaign in Abu Dhabi. The Heroes of the UAE campaign launched by EWS with support from the Agency at the time of writing this update is a campaign that urges people living and working in UAE to reduce their energy consumption; and in doing so, help lower the UAE’s ecological footprint and participate in global efforts to tackle climate change. The campaign is centered around the www.heroesoftheuae.ae website, where people can find out everything they need to know about the causes of the problem and also find out what they can do to help solve it. Principal features of the website include an animated sequence that explains the present energy and environment situation in simple, graphic terms, along with a long list of energy saving tips, a calculator that enables households to establish exactly how and where they can make real savings on their consumption, and a unique pledge facility which enables households to positively state their intention to make a difference.

Further an assessment on current levels of awareness on climate change revealed that only 55% of the respondents felt that climate change was a serious issue. More Nationals, Asians and Arab expats and residents of Al Ain were aware of reasons for climate change. Highest concerns were noticed in women with almost 62% feeling the issue was serious. About 17% did not find the issue of climate change as a serious one and about 30% did not know or were not sure. It is interesting to note that the overall level of awareness about energy use is around 61.6%, though the

level of behavior was as low as 44.8%. This is one of the reasons for adding the objective of efficient energy use in the climate change initiative of EAD to help reduce energy use and thus promote mitigating climate change as well. EAD intends on keeping track of the levels of awareness through the many projects and initiatives implemented by disseminating parties in process throughout the Emirate.

Disaster preparedness - Natural and man-induced hazards and disasters

There has been no systematic awareness program about any natural or any other disaster preparedness either in the country's school curriculum or the higher education curriculum. Some of the expatriate private schools following different curricula have addressed the issue with students as they follow their country's curriculum where hazards occur often and are well known. In fact, many individuals mistakenly believe that disasters, natural or otherwise, cannot occur here and that environmental hazards do not affect our daily lives. The general public largely remains ignorant of the issue.

Bio-hazards

Bio hazards per se did not feature in any environment education and awareness program until the fear of the Bird Flu began all over the world in 2004. In the year 2005, a systematic and well structured awareness program was put in place to address the issue of Bird Flu and preparedness, should the flu ever occur in the UAE. Efforts included producing and disseminating good resource material such as posters, brochures, presentations to students, professionals and public about the issue of Bird Flu.

Oil pollution problems and their effect on the natural environment

Oil being the basis of the country's economy laws regarding oil pollution in the Arabian Gulf is in place and oil companies and environmental organizations work together to prepare for a future scenario should a massive oil spill occur in the future. However, the rest of the groups targeted for awareness have not been yet addressed on this issue on a systematic basis. Oil pollution is being tackled along with general awareness on pollution with students, schools and educators. Regular and distinct awareness programs to combat oil pollution and studying its effects on the environment are not being currently disseminated.



Picture 7.4 Students build solar cookers at a Solar Learning and Education event

The UAE is becoming more and more globalized, which raises many issues especially in regards to those UAE has signed treaties and those that have not been considered as of yet. Some global environmental issues not particularly well considered by the Emirates include:

- Genetically Engineered Food.
- Consumption and Consumerism and how they affect the World Environment (See Appendix 1, for an example of how this could be achieved). With highest per capita ecological footprint this is one issue where there is an urgent need to target the society with effective programs. In fact EWS has undertaken this task under the initiative Al bassma Al Beeyia (ecological footprint initiative). Besides ensuring standardization of data on the basis of which these are calculated, EWS has already conducted workshops with many relevant stakeholders to educate them about the process and ensure help in curtailing this trend.
- Chemical spills and their potential hazards to the population.

The future path for environmental education in the UAE needs to inform people on how they spend their money on different things from Apples to Zip drives. Which of all these consumer products cause the greatest environmental problems and which are relatively benign? UAE consumers need more and better information about the actual impact of their various activities on the environment.

8 ENVIRONMENTAL CITIZENSHIP



8.1 INTRODUCTION

A new age has dawned with an increasingly globalized world, the one in which the private sector has become more empowered, public sector relegated to the background and the civil society becoming more active. Today with the internet, there is a free flow of information, people are able to share problems and issues, are able to find some common solutions as well. People are also becoming aware that government alone cannot solve all the problems, be it social or environmental.

Environmental citizenship is a new term coined to describe the ethical obligations that link us with other members of the biosphere. With the emergence of concept of sustainable development from the Earth summit, there are now multiple players in the field of environment. Never has the multidisciplinary nature of all issues pertaining to environment and involvement of multi stakeholders in its protection as strong as it is today.

The idea of environmental citizenship was first developed by Environment Canada; it is now spreading around the world. UNEP, is also refocusing itself around the concept of Global Environmental Citizenship, and has stressed the need to do so to reach out to embrace religious groups, professional association, media, educators etc. in its quest to promote sustainable development.

Concern for our planet and all its peoples are inextricably interlinked and form a cornerstone of environmental citizenship.

8.2 ENVIRONMENTAL CITIZENSHIP IN THE UAE

The word Environmental Citizenship may be a new word here in the UAE, with its strong Islamic tradition and values stressing on 'Unity', 'Trusteeship' and 'Accountability', that is 'Tawheed', 'Khalifa' and 'Akhrah', the three central concepts of Islam which are also its pillars of environmental ethics, the concept of environmental citizenship is nothing new to the country. In addition with a strong example set by the Late Ruler HH Sheikh Zayed bin Sultan Al Nahyan towards environmental protection and conservation of all natural resources in the country it is no surprise here that, in the emirate of Abu Dhabi the government is committed to reaffirming its faith in sustainable development and support all those processes that will lead towards it.

Sustainable Development is strongly embedded in the current vision of Abu Dhabi and Vision 2030 that the Government hopes to achieve. Sustainable development will continue to remain a utopian concept until and unless the society embraces this through fostering the idea of environmental citizenship.



Picture 8.1 Round table conference on ecological footprint by EEG and EAD

While there have not been any special efforts to promote the idea of environmental citizenship per se in the emirate, examples could be quoted from programs and projects that have been disseminated by various agencies and institutions which address the concepts that promote the idea of environmental citizenship. Below are some examples.

8.2.1 Program with Imams and Preachers

The Environment Agency - Abu Dhabi, realizing the role that the preachers and Mosque imams can play in disseminating awareness, organized a four-day workshop in the year 2003, in which 120 preachers and imams were addressed. They were educated and updated about the environmental issues facing the emirate and their help was enlisted to reach out to communicate these issues during their Friday prayers. The Agency has also reached out to the public through the preachers by making them aware about the issue of waste on more than one occasion to motivate them towards an environmentally friendly behavior. EAD also enlisted the preachers support in enlightening the public on more than three occasions about spreading awareness about the Bird Flu and to ensure the support and preparedness in case of any eventuality.

Environment Agency - Abu Dhabi, as a part of its contribution to the UAE National Day, participated with Al Dar, a private sector enterprise, with the message of environmental citizenship. Display panels on the theme have been prepared by the Agency and these travel from through establishments promoting the theme of environmental citizenship among all.

8.2.2 EEG's CSR (Corporate Social Responsibility Network)

In an attempt to work more closely with the companies that EEG had been networking with for a long time and recognizing the increasing importance of Corporate Social Responsibility, EEG initiated a unique, multi-stakeholder forum for dialogue and partnership known as the EEG CSR Network in 2004. It aims to form a regional network of businesses and corporations to leverage CSR, business excellence and environment protection as powerful tools for sustainable development in the UAE and across the Gulf. Currently, 48 leading organizations make up the network's members. EEG's CSR program is endorsed by the Federal Environmental Agency and the United Nations Development Program (UNDP). As part of this network, EEG conducted series of workshops. International speakers participated and local companies also presented case studies. EEG views the CSR Network as a tool for facilitating open and transparent business policies and practices based on ethical values that make a sustained positive contribution to sustainable development (<http://www.eeg-uae.org/csr/csr-for-eeg.htm>). The Network allows for an open forum for discussing and debating emerging trends in CSR within the region and provides an opportunity for the exchange of ideas and best practices between companies. As such, the aims and objectives of EEG's CSR Network are:

- To demonstrate commitment to the global sustainable development agenda
- To contribute to the national initiative for sustainable development in the UAE
- To position the UAE as a leader in Business Excellence and CSR in the region
- To promote the voluntary adoption of CSR policies and practices among businesses in the region
- To showcase examples of best practice CSR activities undertaken by corporate organizations and public sector enterprises
- To identify benchmarks and key indicators of sustainable growth
- To develop a national databank of CSR case studies to boost research into CSR implementation

- To develop a network for liaison and partnerships with entities that are engaged in CSR programs at national, regional and global levels

The Workshop Series since 2004 has included:

- Launch seminar on March 15, 2004 - 90 attendees
- Workshop on Waste Management and Recycling on May 24, 2004 - 31 participants - 20 companies, government bodies, international organizations as well as individuals
- Forum on Environmental Law on October 13, 2004 - 29 participants - 20 companies, government bodies and international organizations as well as individuals
- Workshop on Sustainable Tourism on November 29, 2004 - 27 participants - 16 companies, government bodies and international organizations as well as individuals
- Workshop on Environmental Impact Assessment on February 27, 2005 - 27 participants - 19 companies, government bodies and international organizations as well as individuals
- Workshop on CSR Reporting and Communications on May 31, 2005 - 31 participants - 15 companies, government bodies and international organizations as well as individuals
- Seminar on Sustainability in the Financial Sectors on November 14, 2005
- Workshop on the United Nations Global Compact on 27 February 2006 – 60 delegates
- Workshop on Energy in May 2006
- Corporate Responsibility and the Energy Challenge on 14 June 2006
- Workshop on CSR in Media and Journalism in September 2006
- Media's Role in Promoting Corporate Social Responsibility on 6 November 2006
- EEG CSR Network Seminar on Climate Change on 28 March 2007

- Corporate Social Responsibility Training Part I on 26-28 June 2007
- Corporate Social Responsibility Training Parts I and II on 26-31 January 2008

8.2.3 Workshop on ecological foot printing

EEG also organized an interactive workshop on ecological foot printing for teachers all over the UAE. In this workshop teachers were trained by expert brought in by the EEG from the Global Footprint Network, and international NGO who support sustainable economy by advancing the methods and application of the ecological footprint. The workshop was held both in Arabic and English. Many teachers from the Government and Private school from Abu Dhabi emirate also attended the workshop. Participants also included environment educators from different disseminating agencies.

To further explain the Ecological Footprint Approach and stimulate interest among different government agencies a roundtable discussion was organized by EEG and AGEDI which brought together professionals and interested parties from different government agencies mainly from Abu Dhabi and other emirates.

The ecological footprint initiative was further taken up in a concrete manner by EWS –UAE through their Al Basama Al Beeiya Project (ecological footprint initiative)

The Emirates Wildlife Society (WWF-UAE), has initiated an ecological footprint initiative in response to the Living Planet Report issued by the WWF International and GEF (Global Environment Facility) in 2006 which placed the UAE as the country with the highest per capita footprint (10.5gha) despite its 53rd position as a country.

The main objective of the project is to educate the public on the concept of the ecological footprint, and secure their buy -in and take the ecological footprint from its niche towards the mainstream and from the erratic to the habitual in people's daily lives. The main audience for this education and awareness are individuals, corporations and the government agencies. To begin with, a UAE technical training workshop on ecological footprint has already been held for environmental professionals from the government, non-government and other private sector undertakings, such as the oil companies.

In spite of reservations about the quality of data that has been used to calculate the footprint, the UAE is committed

to reducing its footprint. The project partners are the Global Footprint Network, the Ministry of Environment and Water, Environment Agency - Abu Dhabi and the Abu Dhabi Global Data Initiative.

As a part of its ecological footprint initiative as high carbon footprint is the reason for high ecological footprint of UAE, EWS launched the energy sustainability campaign under the theme heroes of the UAE in the emirate.

EWS along with EAD as project partner has moved forward with implementing this program to calculate and monitor the national ecological footprint of the UAE to be eventually published as part of the 2008 Living Planet Report country rankings. The ranking considers the nation's demand on natural resources relative to its biological capacity. As a comparative point, in 2006, UAE ranked last on this index, and therefore, highlights the need for further environmental education and awareness to ease the impact of development on UAE's natural resources. The Ecological Footprint program is being conducted in collaboration with the Ministry of Environment, WWF, other UAE agencies, and a host of local, NGO and educational institutions.

As the concept of environmental citizenship is also closely connected to the ecosystem concept, it is worthwhile to mention most of the educational initiatives with schools and students run by the Environment Agency - Abu Dhabi also follow the ecosystem approach. Active environmental citizenship reinforces the holistic approach required by the ecosystem concept.

8.2.4 Conclusion

The Emirates is a culturally diverse place. Herein lies the strength of the emirate in promoting environmental citizenship and environmental awareness. The diversity brings with it creativity and ideas, a podium to share and network. No where are the conditions so harmonious so as to engage with and promote better understanding about various aspects of the environment. This would greatly facilitate the Emirate's road to sustainability.

9 TRENDS AND GAPS



9.1 INTRODUCTION

There can be little doubt that many organizations have spent a considerable amount of time and effort in taking environmental education initiatives in the Abu Dhabi emirate. This is laudable and must continue. However, not all people residing in the emirate have been reached with these initiatives and still much needs to be done. This is clear from the level of awareness achieved so far among the public (48%). However looking at the achievements on Environmental Education by different disseminating agencies so far, the following trends emerge:

- Steep increase in number of environmental education disseminating agencies and personnel since the mid-nineties
- Increase in the variety of environmental education programs and activities offered
- Disseminating agencies have established fairly good networking and communication with some target groups such as schools, women etc. Select projects/ programs like recycling, Enviro-Spellathon, BEA Awards etc. have proved popular in all the Emirates
- Growing commitment from the civil society groups or the NGO's such as EWS (Emirates Wildlife Society), EEG (recognized by UNEP), EFS etc
- Compared to the early '90s, more environmental education resource materials like books, journals, posters, videos and magazines are now available
- Considerable increase in environmental concerns among certain select target audiences such as students and educators. This is clear from the fact that youth and adult women were followed closely by students in levels of environmental awareness in the survey conducted
- Students, teens, upper primary and lower primary rated the highest in terms of behavior. Though they had less awareness compared to youth, there was less of a disconnect between awareness and behavior among students as compared to adults (Figure XX). Thus proving that targeting young pupils and students for education and awareness bears more fruit than adults where though one can increase awareness; behavior changes are slow and low. Among the influencer sample surveyed teachers or educators rated highest in terms of awareness

- Gaps were noticed among educators in knowledge of Abu Dhabi/UAE environmental concerns. They rated electricity and energy use as of most important concern followed by water, waste generation and pollution as major issues. Ozone layer depletion was a cause of concern among all. Low awareness was noted among educators on current concepts and themes like Sustainable Development and Environmental Citizenship
- Most popular topics covered by them in class were pollution followed by climate change, and water and energy. 50% of teachers surveyed did not get any training, whereas others claimed that they received training sporadically
- International recognition such as the Globe Energy Award, International Visual Communication Award and GCC Award for the Environment Agency - Abu Dhabi in early 2000's has helped catapult environment education to a new level in the Emirates

Contribution from Educators

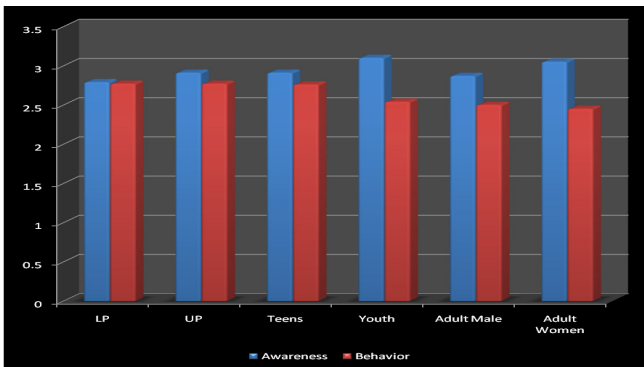
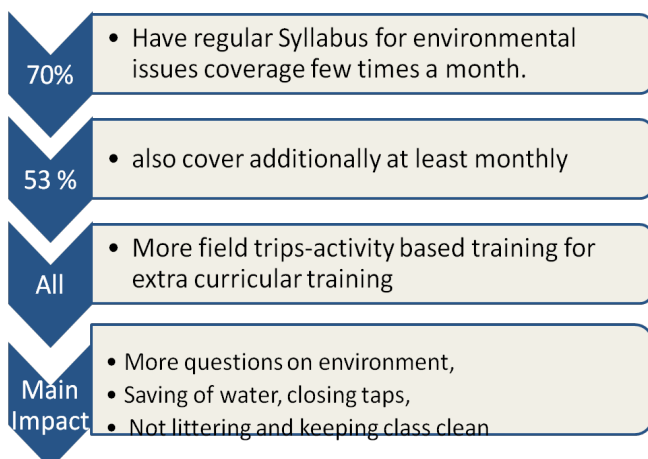


Figure 9.1 Awareness scores for the public sample surveyed



With the perception that many special target groups remain yet regularly addressed and despite the fact that more efforts on awareness could be directed towards occupational groups like the farmers, fishermen, falconers and CITES traders who are all impacted by or impact water, waste and biodiversity issues, their level of awareness was found to be high comparatively. Here too there was a disconnect between awareness and behavior. It is to be mentioned here that some government controls do exist in these occupations. For example for fishermen, CITES traders, falconers, etc.

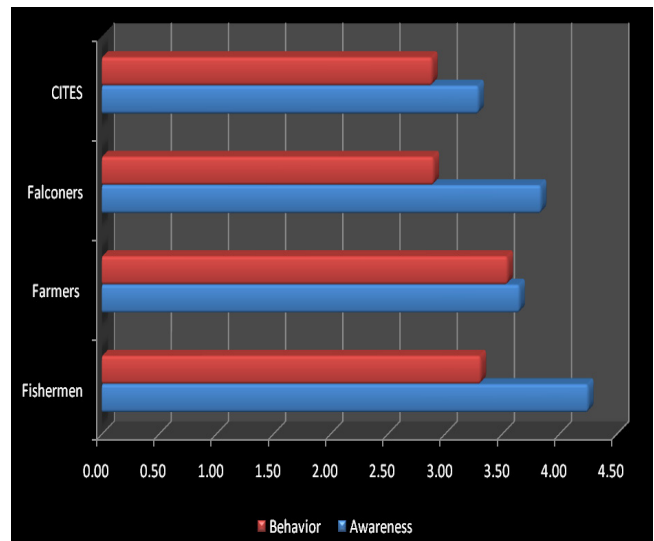


Figure 9.2 Scores on level of awareness and behavior by some occupational segments

Though it is generally agreed that further efforts are needed to reach out to functional groups that impact the environment, e.g. industries, corporations, retail sector, hospitals, hotels, etc., through their activities. Here too, compared to the public sample surveyed, these groups showed a comparatively higher level of awareness. This could be as a result of a combination of factors like big industries, especially the oil and gas sector, having a Health, Safety and Environment Department, which looks into these aspects, and also in most of these professions one also gets more educated personnel. There are also Government controls regarding pathogenic waste from hospitals etc in addition to financial savings involved in usage of water and electricity.

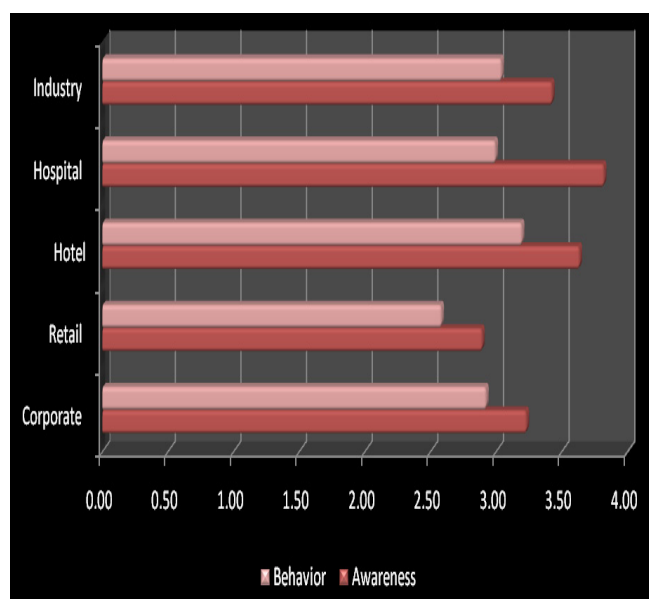


Figure 9.3 Scores on level of awareness and behavior among some functional sample surveyed

The corporate sector has enhanced its concern and commitment on environmental issues, either because it shows good market sense or as a part of their commitment to CSR policy. Some corporate institutions are sponsoring environmental awareness projects and also at the same time pursuing their own programs as well. In the sample surveyed, 60% of the companies surveyed believed that consumption of paper and other office stationary and water and electricity could be cut down in their offices. 40% did have some recycling of paper initiatives set up and wanted proper government guidelines and infrastructure for waste management. 10% were committed to raising their staff awareness and 18% has initiatives to raise customer awareness and participation.

Changing Media

Increase in environmental concerns among the population is also partly attributed to the efforts of the media. Without their synergetic efforts, all environmental education efforts would have been diluted. Media coverage of environmental issues is abundant and has significantly altered the dimensions of public debate not just in the Emirate of Abu Dhabi, but at a national level too. It is important to highlight the importance of the media in environmental education here, for it is to be understood that awareness is a step towards EE. While the media includes both the print

media and mass media, it is the print media which has contributed more to environmental education in the emirate.

Media was quoted by one and all surveyed as their main source of environmental information and awareness. Among the sample surveyed from the media sector, media professionals exhibited a higher level of awareness due to the nature of their profession and was also most informed about environmental issues in the emirate and in the UAE. They rated water, followed by electricity, energy, waste and pollution as of major concerns, and all felt climate change is the most important issue today that needs to be tackled.

They also expressed that water pricing should take care of all the water woes in the emirate. They stressed the need for the public to be more action oriented, at the same time this they felt should be done through increased awareness and persuasion. They also expressed the need for a stronger government control and penalties for environmental misdeeds.

Media has taken on a more active role in environmental awareness. Especially noteworthy is the Gulf News campaign on plastic waste during 2008, which helped initiate the use of alternatives to plastic bags in the UAE and also in Abu Dhabi Emirate's supermarkets and engaged young students and college students in conducting campaigns against use of plastic bags. Currently, at the time of updating this sector paper, they are involved with another campaign on waste. This trend in the media is noteworthy as during the time of the first edition of this sector paper, during 2001-2005, media coverage, largely concentrated on reporting of environmental events in the Emirates and less on feature articles that could help raise awareness. Thus, maximum press coverage was seen on reporting of environmental education and awareness events conducted followed by covering biodiversity issues, pollution, CITES and biohazards like Bird Flu, water, waste etc. Currently media has become much more proactive.

From the current survey the following was noted:

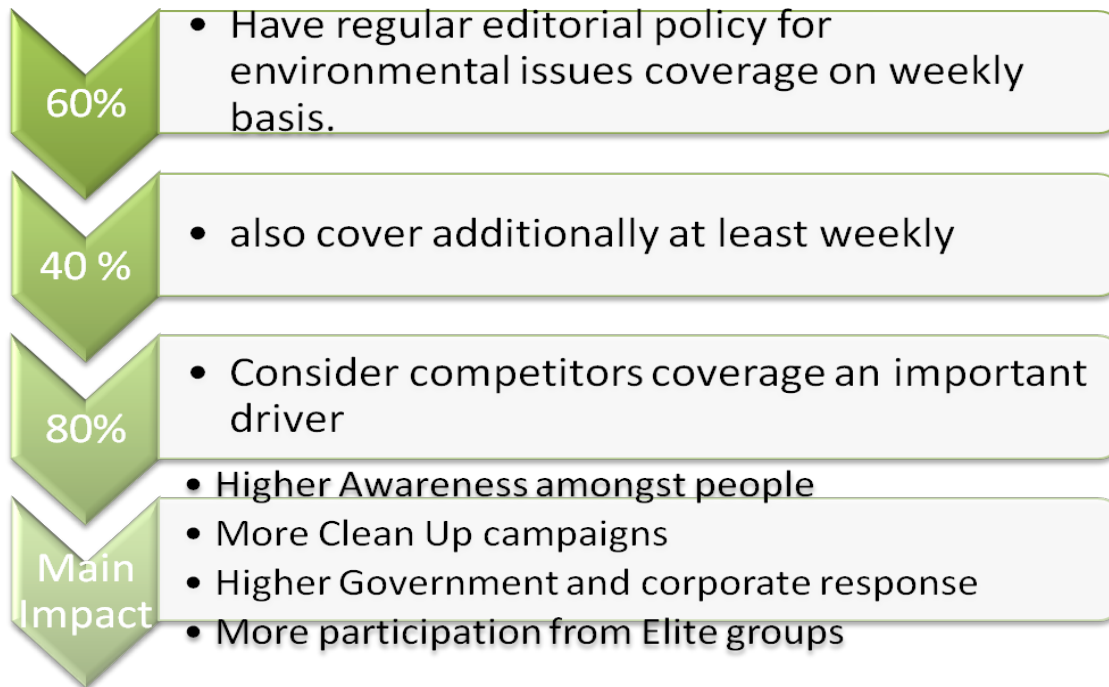


Figure 9.4 Influence by the Media

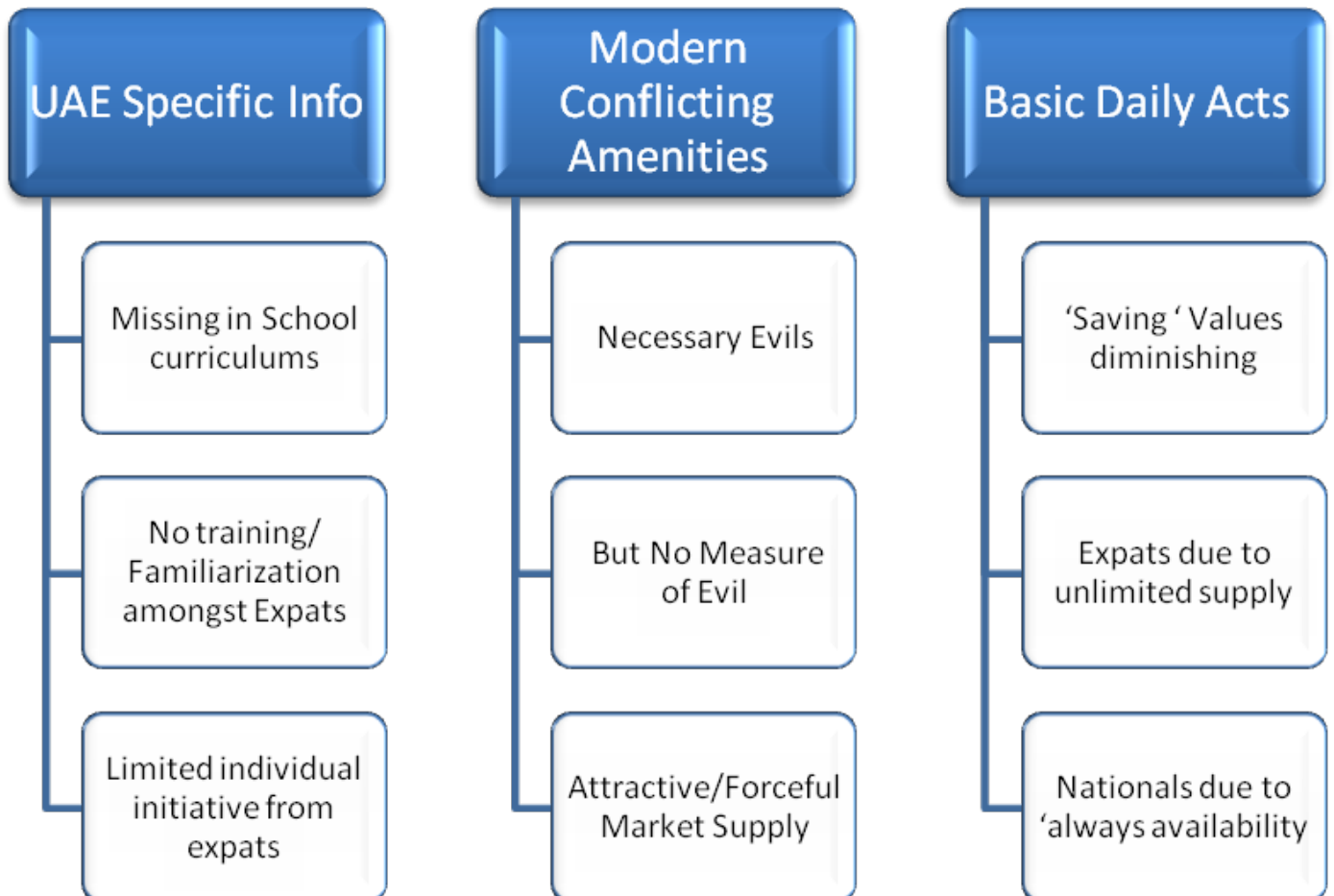
Most popular topics covered in the media were water and energy followed by climate change and ozone layer depletion. Media's main source of information was the government sources and publication followed by internet. Only 20% of reporters got trained through attending meetings, workshops, lectures and conferences. Most preferred practical training. Here it is to be mentioned that Environment Agency regularly conducts media tours to important habitats and protection areas. They felt the need for more training for children and educators. They also expressed their desire for having good availability of statistical data and information regarding environmental issues in the emirate through a dedicated source.

The general trend revealed by the survey shows that level of awareness among overall population is averaging as the average. There are large sections of ignorance in the UAE on specific environmental issues on themes such as high rate of water, electricity, fuel consumption, depleting fresh water sources, impact of desalination, pollution rate and knowledge of flora and fauna. Those populations with generally higher levels of awareness faired poorly in behavior due to conflicts with modern amenities that is made easily available and abused. Hence, on one hand, high consumerism and standard of living promotes more wasting of resources, and on the other hand, this is accompanied by those basic daily acts that used to be all

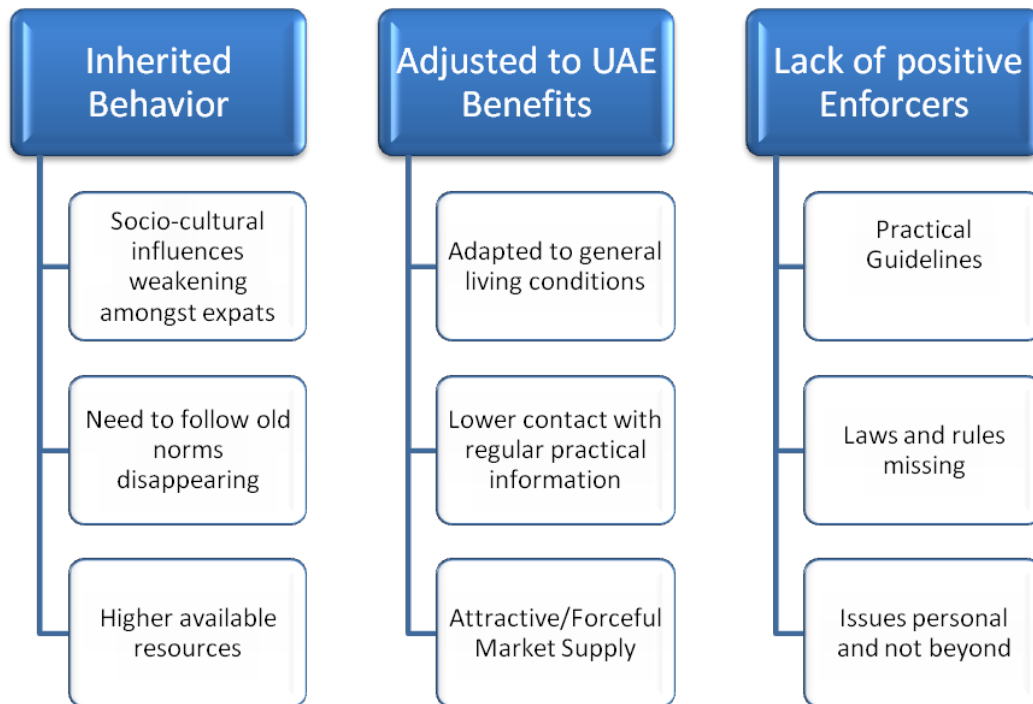
important in the past. The role models and the influencer population that can bridge this gap itself revealed the need for more capacity building and empowerment. Most functional groups were not interested in curbing high consumerism trends. All are more concerned with business and commercial goals. They are all doing minimum necessary acts for environmental issues, and that too is due to government controls.

As preachers exert one of the most powerful influences in public behavior, it was found in the survey that preachers had only a fair knowledge of environmental issues in the emirate. Most serious environmental concern for them was use of fuel and least was pollution. They had least awareness about current global issues or environmental concepts in use today among other influencer sample surveyed. 70% of preachers surveyed maintained that they cover environmental issues regularly in weekly sermons. 40% claimed that they also additionally target environmental issues whenever they get a chance. They felt that their main impact is on making people more oriented towards cleanliness. Most popular topic covered was about plants and animals, followed by pollution and wastage of water. They stressed the need for more support and funds and more training. Currently their main source of information was from mass and print media.

Lack of Deep and Value Based Insights



Hence the missing link between awareness and practical implementation can be mapped as follows :



Though pollution was the most talked about environmental issue across all segments surveyed, the highest level of awareness was scored on energy issues and lowest on water as mentioned before in previous chapters, a priority concern for the emirate. However it is to be mentioned that level of behavior on energy issues was comparatively quite low. The following table shows percentage level of awareness and behavior among the public sample surveyed on different environmental issues.

Prior to EAD's new strategic initiative and the IPCC Climate Change Report of 2006, waste was the top issue that reached out to the maximum number of people as almost all disseminating agencies targeted this issue in their programs and activities (either through formal programs or through cleanup campaigns and/or recycling efforts). While there is much awareness regarding waste still currently according to EAD's efforts in 2008, energy awareness is taking the forefront.

Issue	% level of Awareness	% level of Behavior
Water	42.8%	40.6%
Energy	61.6%	44.8%
Waste	52.4%	42.9%
Pollution	50.8%	46.6%
Bio diversity	42.9%	42.6%
Global issues (ozone depletion, climate change, sustainable development, environmental citizenship)	50.4%	44.8%

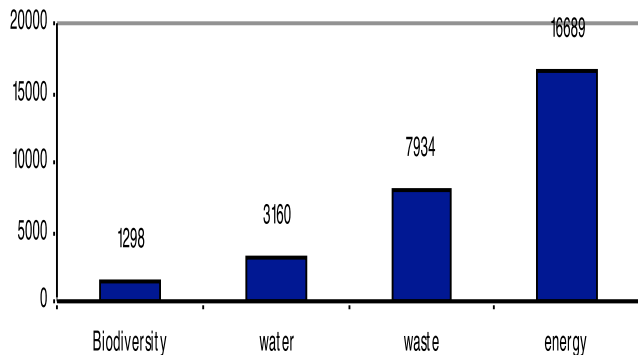


Figure 9.5 People targeted by EAD on prioritized issues in 2008 on one-to-one basis

9.2 COMPARING EMIRATE'S AND ARAB REGION PUBLIC OPINION ON ENVIRONMENT

Complimentary to the findings given above, the Arab Public Opinion and the Environment Conference was held in Beirut, Lebanon, 16-17 June 2006 that facilitated the discussion of an 18 country survey about environmental trends in Arab countries (Tolba and Saab, 2006). The survey was organized by Al-Bia WalTanmia (Environment and Development) magazine, in cooperation with the Regional Office for West Asia of UNEP and the Council of Arab Ministers Responsible for the Environment (CAMRE). Results from the following 18 countries were included in the report: Algeria, Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, UAE and Yemen. Both in the Abu Dhabi survey and the survey by the Arab Public Opinion and Environment Survey media is the most preferred way of getting environmental information, high degree of emphasis is placed in need for more environmental awareness. Pollution and waste are some of more important concerns expressed by target audience in both the surveys and finally the public is willing and wants to participate and contribute in environmental efforts.

The following graphs taken from Tolba and Saab (2006) illustrate some of the key results:

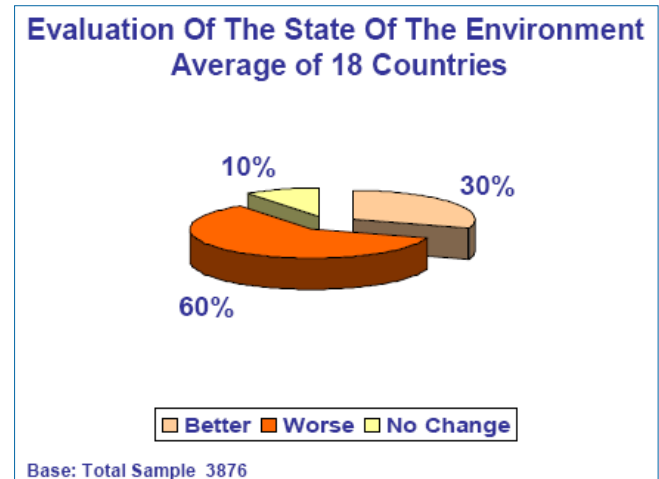


Figure 9.6a Evaluation of the SoE average of 18 countries

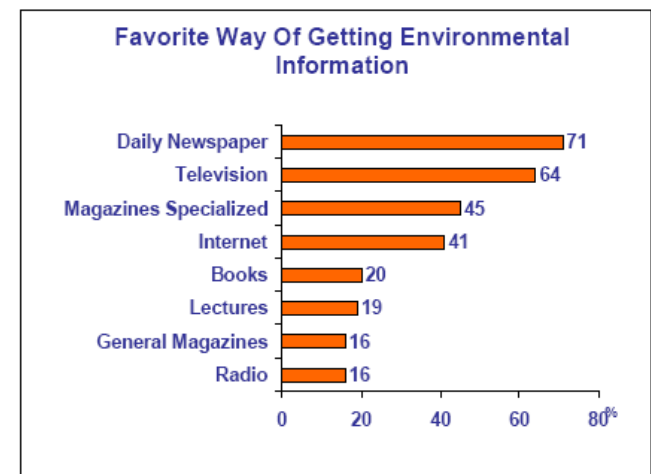


Figure 9.6b Favourite way of getting environmental information

Abu Dhabi survey also corroborated this as almost all referred to media as their main source of information gathering on environment.

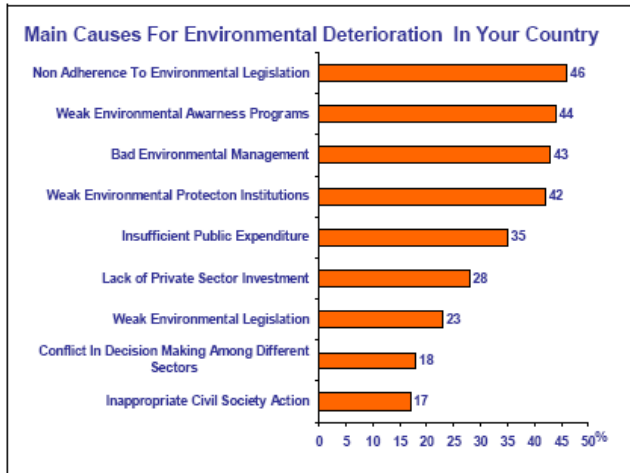


Figure 9.6c Main causes for environmental deterioration in your country

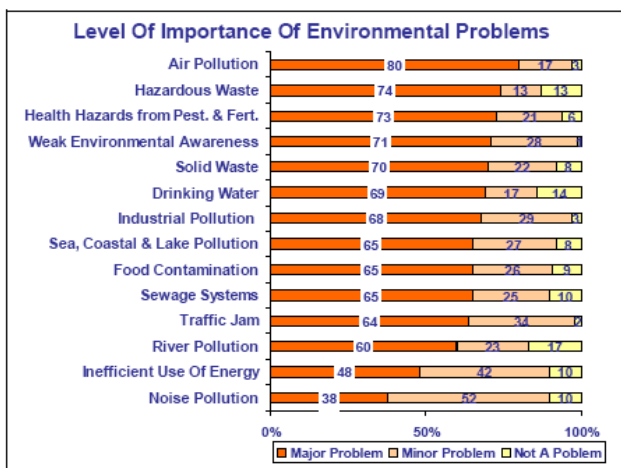


Figure 9.6d Level of importance of environmental problems

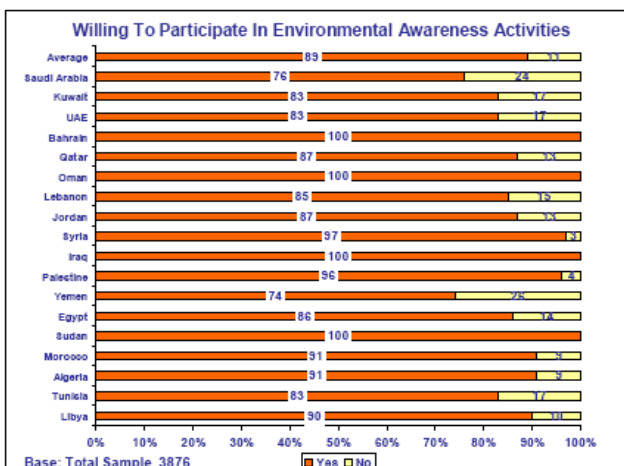


Figure 9.6e willing to participate in environmental awareness activities

It should also be noted that in 2008, EAD undertook a project commissioned to Columbia University in New York, NY, USA via the AGEDI program to develop a framework for the Abu Dhabi Environmental Performance Index (ADEPI). The Environmental Sustainability Index, for which the EPI is an advanced form of, was originally published in 2002 and ranks countries in terms of their overall sustainability. At the time, the UAE did not score well, however, further evaluation of the EPI framework indicated that the indicators used at the global level were not sensitive to arid, desert type climates like that the UAE faces. As such, EAD commissioned Columbia University to come to Abu Dhabi and work with EAD and various stakeholders to better understand the local conditions and develop a framework that Abu Dhabi could use to better evaluate its environmental performance, while also informing the global EPI such that the sensitivity in the regional climate could be considered. As part of the ADEPI, and based on the environmental awareness and behavior surveys, indicators for environmental awareness have been included so that the survey could be used as a basis to better understand how well Abu Dhabi is doing in reaching higher awareness levels within the Abu Dhabi population.

10 GAP ANALYSIS



- Environment programs have grown and mushroomed haphazardly without proper coordination between the disseminating bodies. With EAD's transformation from more of an implementing body in awareness dissemination to one that of monitoring and a regulatory body, there needs to be a mechanism set in place wherein all efforts at awareness dissemination can be collated and evaluated. This is especially important now as one of the expected outcomes for Abu Dhabi Emirate from the Executive Council is to develop an aware and well informed society.

- There is a need for a national environmental education or awareness policy and a directive set in place. This would help leapfrog all environmental education and awareness efforts and also help systematise EE efforts as well among all parties.

- Only a small percentage of the student population had actually been reached out to on a sustained basis even though most agencies concentrated most of their efforts on this population. According to the survey, it is clear that students and teachers show a fairly good level of awareness and that what is missing is action-oriented learning. There is a need to come up with programs that can yield concrete results. This is to be done along with increasing the outreach of the students as well.

- The whole edifice of awareness achieved with students so far in schools is most often based on a couple of motivated teachers from select schools who are active in promoting environment education with their students or schools. With a high turnover of teachers in schools, there is a risk of fallout of all that has been achieved so far. While the current education zones and the newly established Education Council give great support to environment education programs organized by the different bodies, there is a need to prioritize environment education and awareness in schools and a need to systematize and structure efforts for effective solutions and to work together from a common platform.

- Plans, processes and efforts are still underway for greening the national curriculum, i.e. to introduce environmental concepts in different subjects, but as yet there is no clear cut date for its launch. With the restructuring of the educational departments within the Emirate, there is as yet no indication of when the greening of the national curriculum actually would take place. Currently, there are two authorities dealing with Education in the Emirate - one is the Abu Dhabi Education Zone, and the other is the newly formed Education Council. Both are looking at changing the curriculum, however, it is not clear as to which of these should be approached for all the efforts that have already

been formulated by Environment Experts to be amalgamated into the school curriculum. . While it is clear that Abu Dhabi Education Council is slated to take on stronger controls, the process of transition is still on.

- There is also a need to involve more youth force in awareness programs. With their energy, dynamism and creativity, they can be the manpower that environment education badly needs to increase its outreach. During the last two years, the Youth volunteering program set up by the Emirates Foundation is a welcome effort as these youth are motivated and have helped in organising many environmental activities such as clean-up campaigns or volunteer activities for major environmental occasions. The National youth should also be networked with regional and global environmental networks.
- There is a need to establish institutional support to take EE forward as there is no organization yet devoted to developing and designing quality Environmental Education and Awareness material to be disseminated. In addition, with the changing role of the EAD as a more regulatory body, a defined organization to implement environmental education and awareness programs has become more limited.
- There is a need for more community groups and associations within the emirate to come forward with more committed volunteers and with clear cut plans. They could collaborate with the Environment Agency to show them a way forward with their budget and other infrastructure constraints. In most other countries, the main thrust of Environmental Education is in the hands of civil society and community groups who work with the government in trying to reach out to large sections of the population.
- While many books, journals and other resource materials have been produced time and again by different agencies as compared to the resource material needed, there is still a lack and a strong need to develop resource materials on important issues for all target groups. This would go a long way in capacity building all group and also help in decentralizing environment education and awareness efforts.
- Having established environmental concerns there is now a need to establish regional and international networks to learn and share best practices. There is also a need to benchmark Emirate's level of awareness with international and regional standards.
- There is also a strong need to build the capacity of the current environment educators as rarely people competent in environmental subjects combined with educational training

come forth to disseminate awareness.

- Environment education needs highly motivated and well qualified trained environment educators, without which achieving true environmental awareness runs the risk of being mere rhetoric.
- Above all, there is an urgent need to train more nationals as environment educators as they are the custodians of this country and they need to set an example and take the lead to encompass other nationals and expatriates in green thinking.
- Currently only the print media is most active. There is a need to involve mass media and electronic media to help reach out to a larger audience and cover more issues. It was made clear that Media is considered by all targeted audience to be their major source of information. Thus it lays a responsibility on Media professionals to live up to the people's image and expectations.

10.1 CONCLUSION

In conclusion, it is imperative that all Environmental Education disseminating agencies set some common principles and orient their programs and activities towards it. There is a need for a new, holistic and practical paradigm. Environmental education must move along the long path to sustainable development. The new approach must be integrated and not taught as separate themes without any obvious connections. Target audiences need to be enlarged. The whole community must be involved and wish to be involved in sustainable development, for it to have any chance in changing the way people think and behave towards Earth.

This is a tall order and all kinds of resources, which at present are in short supply, must be made available. It must be recognized at the highest level that progress will be slow, but continuously in the right direction.

A clear structure, which includes government, government agencies, educational institutions, the private sector and related organizations, needs to be established. Thinking must be fluid and holistic, which is not always the case at present.

It is high time for environmental education to move towards education for sustainable development. It must include and change the thinking of all people. It will be a slow and difficult process, but that should not stop it from happening.

11 The Way Forward: From Environmental Education to Education for Sustainable Development



“Conservation of the environment is not and must not be seen as a matter only for Government or officials. It is something that concerns us all.” - The late Sheikh Zayed bin Sultan Al Nahyan, Founder of the United Arab Emirates.

Agenda 21, Chapter 36 stresses the need to promote environmental education and awareness. Moreover, the Millennium Development Goals and the Decade for Education for Sustainable development (2005-2014) stress the need to enhance human resource potential through environment education and education for sustainable development and to actively engage civil societies on issues concerning environment and sustainable development.

Right since 1996, with the formation of Environment Agency in Abu Dhabi, Environment education and awareness has been placed as one of the strategic actions to pursue for effective environmental protection and conservation measures. Working to enhance the society's awareness still continues to be one of the main actions in the Emirate today. In 2005, with the change in the mandate of the Environment Agency and with the declaration of 2005-2015 as the decade for Education for sustainable development, there was already a move to include issues of environmental sustainability in efforts undertaken to impart environment education.

The Emirate needed to move forward from just conducting focused and non formal program to systematically target each section of the society on prioritized environmental issues especially with rising per capita ecological footprint. While the debate still is on in the world about the differences between Environment education and Education for sustainable development, the writing on the wall for future environment education endeavors became clear for the Agency for all other disseminating parties with Abu Dhabi Government's restructuring process and declared intention to pursue the path of sustainable development in its vision statement.

It is worthwhile here to mention the difference between environment education to education for sustainable development as espoused by IUCN.

Difference between Environmental Education and ESD (source: CEC- IUCN).

EE	ESD
Learning about nature only.	<i>Learning throughout life.</i>
Addresses what people and community are deficient in.	<i>Values what people, communities know, do and value.</i>
Top down approach.	<i>Bottom up approach.</i>
Content oriented.	<i>Process oriented.</i>
Focuses on values that people need to acquire.	<i>Focuses on values that people already have.</i>
A teaching process.	<i>A learning process.</i>

Table 12.1 Environmental Education vs ESD

While many would argue, and rightly so, that even before the direction for education for sustainable development was put forth, issues of environmental sustainability, such as waste production versus consumerist behavior, inequitable water use, environmental health, etc. were already looked at. Then looking at the table above it can be surmised that the change is more that of a pedagogical approach to environmental education and awareness issues.

All would agree that there is a need to foster critical thinking and problem solving skills, understand human - environment relationships, understand and be open to alternate world views, be aware that the natural earth's capital is already overshoot, realize that an aware and educated population can actually shape, lead and provide possible solutions to the path of sustainability.

It is interesting to compare the above rhetoric and concepts with what the results of the survey conducted to assess the extent of environment awareness in Abu Dhabi Emirate indicated and then compare it with what the Emirate's current strategy for environment awareness has to offer as a way forward for at least next 5 years

The recommendations drawn from the survey is as follows

1. Increase the level of awareness – With the current levels of awareness averaging as the average, there is a need to increase the level of awareness. At this juncture it is important to note that Increasing society's level of awareness' is not only stated as one of the 13 priority for the Environment Agency Abu Dhabi but this is also corroborated by the expectation stated in Abu Dhabi's outcomes to meet with the vision of Abu Dhabi .Besides

awareness also features strongly in the 2030 vision of Abu Dhabi.

- Having stated this, it may be worthwhile to note the following points suggested by the survey as a way forward for raising the level of awareness
 - Uniform and consistent awareness be imparted in UAE specific environmental issues across all segments to all people as current surveys suggests that those who did show a higher level of awareness lacked the UAE specific knowledge
 - A strong need to have enhance awareness and which is action oriented across all educational institutions
 - That segment specific modes and methods are adapted for awareness, the gap observed between level of awareness and behavior is due to lack of segment specific modes of targeting. It is to be remembered that Emirate is populated by people from different nationalities, educational background and socio economic groups etc. Choosing effective method and language for awareness dissemination is of utmost importance. Need to develop a technique on what works best with current prevalent culture and mindset of the different population in the Emirate.
 - Need for a consistent and regular campaigns. It was observed good campaigns usually have a short life span here and there is no follow up and hence advantage gained is often lost .

2. Improving level of behavior – Awareness campaigns and activities are only means to an end, the ultimate need is to alter the behavior or mind set of the population, to make them more environment friendly in their day to day behavior. This alone will help reduce the per capita waste, water or energy consumption etc. To achieve this, all campaigns and activities need to be made personal. Hence whatever the educational or awareness action that an organization or agency may take, it is suggested that they follow a 5 step approach as below



3. Development of supportive regulation and infrastructure

There is a need for a sound environmental education and awareness policy to be a part of environmental policy and strategy that all are made aware of. This would help elevate education and awareness raising efforts to new height. In addition to this there is also a need for setting up some infrastructural support for the people to take action in changing their behavior. For example one of the

serious drawbacks is source segregation of household waste which actually led to a cavalier attitude towards waste from the public. Fortunately this is being addressed by the waste management center now established by the Government which is working towards implementing a sound waste management and strategy for the Emirate.

4. Need to promote and encourage positive influencers – It was noted in the survey that public is influenced by several role models or influencers hence it is needed to use them in a structured and creative manner for a desired behavioral change.

There is a need for enhancing the training of influencers such as the teachers, preachers, and awareness professionals.

Need to enhance the role of media - Media was identified as the most dominant Influencer by all hence it is recommended that they be structured and trained to influence public, market place and other influencers. For this training and workshops for the media has to be organized regularly and consistently and secure their buy in towards all efforts at awareness.

Need for a positive and governed market place - The Business and Market-place is yet not governed with environmental friendly regulations and framework, as a result on one hand efforts are made to enhance awareness on environment among the public and on the other hand they are lured into increasing consumerist behavior as a result of market place mechanisms that are currently in place with little environmental regulations or control imposed on them. Hence some guideline needs to be set in place. It is to be noted that while some industries are observing and adhering to regulations and exerting environmental controls, others too specifically the medium or small size industries needs to follow the suit.

5. Encouragement through incentives and Awards

– The feedback from the survey clearly indicated the impact of right kinds of incentives and awards that can induce the desired environmental behavior change. Most public segments as well as Influencers have suggested and asked for rewards and incentives to induce, motivate and consistently practice environmental friendly behavior. These rewards can be monetary or Non-Monetary and can be designed suitably for each segment.

In line with the survey's results mentioned above, it is noteworthy to mention the direction which the

Emirate is taking. As a part of its new mandate and strategy Environment Agency – Abu Dhabi held series of stakeholder dialogues with all relevant parties and organization to better coordinate awareness efforts among one another in the year 2008. As per 2009-2013 strategy, the awareness efforts have become more issue based than target oriented. The projects as mentioned before for the next 5 years for the Agency are

- A. Promoting Education and Awareness initiatives on prioritized issues to reach all :- under this the main issues which have been taken up for the current year when this paper is being taken are
 1. Engaging society in Climate change Enhancing awareness on waste
 2. Enhancing awareness on biodiversity
 3. Target 350 – Aimed at reducing water use from the current level of over 500 liters/capita to 350 liters per capita in the next 5 years
- B. Sustainable schools initiative
- C. Initiating an Environment Education and awareness policy and act
- D. Establish an environment awareness Institute
- E. Tracking awareness levels achieved annually
- F. Enhancing awareness through conferences , events and workshops
- G. Utilize effective media strategies

Since the last edition of the sector paper on education, there has been a total transformation of the approaches taken for EE in the Emirate. Notable among is the active involvement of community group such as Environment Wildlife Society (WWF-UAE). As a part of MoU signed with the Environment Agency, EWS has taken not only conducting the Enviro-spellathon program targeting more than 150,000 students in the Emirate and also spreading it in other emirates as well but has undertaken to target Emirates population through a very structured campaign to reduce energy, water consumption as well. The ongoing heroes of the UAE campaign for energy sustainability is a case example.

In an effort to open up and expand environment education and awareness efforts and also make it more transparent and accountable the Environment Agency has committed to increasing the level of awareness among the Emirate's population from the current baseline figure of 48.9% to 65% in the next 5 years and similarly level of behavior to be raised from the current baseline of 44% to 57% in the next 5 years. The Agency is also declared as the champion for reporting on the expected outcome for the executive council on society's level of awareness

A new era has started in the Emirate for a closer cooperation among all stakeholders to raise awareness together. Series of stakeholder dialogues as mentioned before on water, biodiversity, Climate change and also on general about environment education and awareness have been held in the Emirate. In fact in the stakeholder workshop conducted for environment education and awareness in the Emirate, there was a unanimous agreement about the mechanism to better coordinate the efforts in the Emirate by reviving , restructuring and empowering the Abu Dhabi environment education and awareness committee which was formed as a result of a royal decree issued by HH Sheikh Hamdan bin Zayed Al Nahyan, Deputy Prime Minister, Minister of State for Foreign Affairs and Deputy Chairman of EAD to better coordinate all education and awareness activities by all parties for better and effective outreach. As the legal mandate already exists, this revival would be mutually beneficial and will foster an era of coordination and sharing.

Faced with high per capita waste production, high water per capita water consumption, loss of habitats and biodiversity and high carbon footprint the future for an effective environment education and awareness lies in taking a more inclusive approach, with more networking nationally, regionally and internationally specially with overarching issues like climate change and water stress etc and over and above with more outreach to embrace the whole society to make a difference. Whatever approach one may take it can be stated unequivocally that education and awareness is one of the principle vehicle through which one can attain sustainability.

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14 Appendices

14.1 APPENDIX 1: REPORT FROM ZENATH RECYCLING AND WASTE MANAGEMENT

Report from Zenath Recycling and Waste Management (L.L.C). Waste Paper Recovery in Abu Dhabi Emirate from different establishment can be classified as follows:

- Shops (Grocery, Supermarkets and Shopping Malls);
- Packaging Companies;
- Printing Press;
- Schools and colleges;
- Offices;
- Recycling bins installed with help of Non Government Organization such as EEG and EFS.
- Environment Agency - Recycling Bins;
- Zenath Recycling and Waste Management(L.L.C) Recycling Bins;
- Municipality Waste Bins.

The waste paper being recovered from the above sources are collected by various companies who are dealing the waste paper. The waste Paper companies are having their own labourers and vehicles to collect the waste paper. These waste paper companies are segregating, baling, selling locally to Paper Mills and also Export the waste paper. Waste Paper Companies:

- Zenath Recycling and Waste Management(L.L.C)
- Union Paper Mill
- Bin Abbas
- Al Anwar

The above companies are officially recognized by the Abu Dhabi Municipality. All these companies are collecting various grades of waste Paper as details given below:

- Old Corrugated Carton - 1500 tons per month approximately;

- New Carton Cuttings -75 tons per month approximately;
- Printing Press cuttings-400 tons per month approximately;
- Over Issued News Paper--175 tons per month approximately;
- Office Waste Paper-400 tons per month approximately;
- Waste Film Scrap--50 tons per month approximately;
- Plastic Industrial waste recovery- 350 tons per month approximately.

The Old corrugated Carton and New Carton cuttings are recycled locally by Union Paper Mill (430 ton per day, Dubai), Gulf Paper Mill (100 tons per day, Jebel Ali) and another small mill (50 to 70 tons per day) in Umm Al Quwain.

ETA-ASCON group of company is investing to set up a paper mill in Industrial City of Abu Dhabi which the land is allotted by ICAD with a capacity of 300 tons per day to produce the Duplex Board in the name of Zenath Paper Traders using the Over Issued News Paper & Magazine, Office Waste Paper and Old corrugated Carton. We also are setting up a Plastic Recycling factory in the name of Zenath Star Recycling with a capacity of 100 tons per day in ICAD to recycle the PE and PET items.

The awareness about the waste paper recovery is increased among the public over a period. Especially the shopping bags, milk containers, Juice cans which are thrown in to garbage bins are not at all recovered. It is a dangerous threat to the Environment. The waste has to be segregated at source itself to avoid land filling.

14.2 APPENDIX 2: LIST OF EE GENERAL MEETING

The list of general meetings conducted by EEG that have covered and related issues is given below. The meetings have been well attended, each having between 80 -120 attendees. They have been hosted by EEG member hotels.

Marine Pollution - 19th October 1993 - Dr. Saif Al Ghais, Secretary General, Environmental Research & Wildlife Development Agency, Abu Dhabi.

State of Coral Reefs in the Arabian Peninsula - 26th February 1996 - Dr. Bernard Riegl, Lecturer in marine Biology, University of Vienna.

Ground water Resources in the Emirates of Abu Dhabi - 25th March 1996.

Dr. I. Hamed, Head of Special Research Center, Ground water resources, Abu Dhabi & Mr. Abdulla Kamali.

Coastal Habitats of UAE & their conservation - 30th March 1997 - Dr. Richard Hornby. Researcher, National Avian Research Center & Federal Environment Agency.

Water: The journey from the sea to our homes - 25th June 1997 - Mr. Nader Mohammed Desalination & Water Marketing Manager, Dubal.

Oil Spills-A Dark Threat to the Marine Environment - 22nd February 1998 - Capt. Ian Reed, Marine Adviser for the Middle East Region - Shell Trading (Middle East) Ltd.

The story behind the Umm Al Quwain's Oil Spill - 21st February 2000 - Mr. Peter Holloway, Manger of London Offshore Consultants, Abu Dhabi.

Dubai's Water Supply & Treatment - 28th March 2000 - Mohammed Ali Al Jariri, Senior Environmental Engineer, DEWA .

The Colourful Underwater World of the UAE - 24th April 2000 - Ms. Carol Harris, Expert diver and Senior Quality Specialist, FedEx.

Regular Marine Pollution and Ways of its prevention - 26th February 2001 - Dr. Abu Bakr Al Saggar, General Manager, Environmental Services LLC and ECOREF FZE.

Managing Oil operation effluents - 17th June 2001 - Mr. Ibrahim Al Suwaidi, Drilling. Manager, ADMA-OPCO.

The Ship Owner/Operator Role in Protecting the Marine Environment - 27th February, 2002 - Mr. Ashley Buhl, Marine Manger/Marine Technical Advisor, Shell Markets.

Water Resources - 25th May, 2002 - Mr. Pankaj Tripathi, Creative Director, Cube.

The Status of the marine life in the Arabian Gulf - toward effective protection and management - 28th September, 2004 - Dr. Waleed Hamza, Chairman, Biology Dept., Faculty of Science, UAE University.

Save Water - 28th September, 2005 - Eng. Hisham Ahmed Bukhari, Dept. of Drainage and Irrigation, Dubai Municipality.

14.3 APPENDIX 3: RECOMMENDATIONS OF TOPICS + CONCEPTS THAT BE INCLUDED IN EE CURRICULUM

This is an example of the kind of material which could be covered at various levels, in the UAE education system in environmental education in the future. It is current, hard-hitting, accurate and examines flaws in our society and hopefully suggests some recommendations for the future.

The hidden face of consumption and consumerism

Today's consumption patterns undermine the world's environmental resource base and nowhere are these more apparent than in the affluent UAE society. Consumption is exacerbating inequalities, and the dynamics of the consumption-poverty-inequality environment nexus is accelerating. If the trends continue without change (not redistributing from high income to low income consumers, not shifting from polluting, to cleaner goods and production technologies, not promoting goods that empower poor producers, not shifting priority from consumption for conspicuous display, to meeting basic needs), then today's problems of consumption and human development will worsen.

Inequalities in consumption are stark. Globally, 20% of the world's people in the highest income countries accounts for 86% of total private consumption. The poorest 20% account for a minuscule 1.3%. Runaway growth in consumption in the last fifty years is exercising strains on the environment as never before seen. Nowhere is this more apparent than in the UAE. In the UAE, we consume a variety of resources and products today, having moved beyond basic needs to include luxury items and technological innovations to try to improve efficiency. Such consumption beyond minimal and basic needs is not necessarily a bad thing in itself. However, increasingly, there are important issues around consumerism that need to be understood. For example:

- How are the products and resources we consume actually produced?
- What are the impacts of that process of production on the environment, society, on individuals?
- What are the impacts of certain forms of consumption

on the environment, on society, on individuals?

- Which actors influence our choices of consumption?
- Which actors influence how and why things are produced or not?
- What is a necessity, and what is a luxury?
- How do demands on items affect the requirements placed upon the environment?
- How do consumption habits change as societies change?
- How much of what we consume is influenced by advertising?
- Culture is also influential in many societies, and is very strong here in the UAE. What affect does this have on consumption and consumerism?
- What is the impact on poorer nations and people on the demands of the wealthier nations, such as the UAE?
- How do material values influence our relationships with other people?
- What impact does this have on our personal values?
- These questions help us see that consumerism and commercialism are at the very core of many, if not most societies. The impacts of consumerism, positive and negative, are very significant to all aspects of our lives, as well as our country and ultimately the planet.

Any future environmental education system should include the following framework on this subject:

- **Creating the Consumer:** looking at the rise of the consumer and the development of mass consumer society.
- **Children as Consumers:** this is a stark example of how consumption and its associated impacts can be embedded in our society for the long term.
- **Effects of Consumerism:** because consumption is so central to many economies, and even to the current forms of globalization, its effects therefore are also seen around the world. How we consume, and

for what purposes, drives how we extract resources, create products and produce pollution and waste. Issues relating to consumption hence also effect environmental degradation, poverty, hunger and even the rise in obesity. It is a fact that much of the world cannot consume at the same levels as the developed world currently enjoys today. There are just not enough resources to go around.

- **Tobacco:** is an interesting case study in consumption. It is totally unnecessary, but kills millions of people, exacerbates poverty, damages the environment in many ways and contributes to world hunger. This is a waste of our wealth in capital, labour and resources, but we still continue to smoke.
- **Obesity:** is a growing world problem, and is a significant problem here in the UAE. Underlying causes should be examined, and potential actions to combat obesity should be explored.
- **Beef:** is an excellent example of enormous waste, in resources, environmental degradation, in contributing to world hunger, poverty etc. An increasing amount is not even for local consumption, it is to fuel the ever-increasing demand for the fast-food industry. The UAE is an excellent example of how people's tastes can be influenced and how demand may be created.
- **Wastefulness:** wasted wealth, capital and resources show how wasteful our societies currently are. Waste is a misuse of the environment and should be seen as such

