# GRC Environment

Research Bulletin

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It appears that as economies grow, traffic, waste, greenhouse gas emissions and ecosystem destruction also increase. The management of natural resources as well as chemical and hazardous wastes has not kept pace with economic development in GCC countries. Besides the long-lasting conventional threats, especially those from oil and gas industries and water scarcity, the Gulf region is witnessing now a growing environmental threat from rapidly-growing construction along the Gulf shores. Growing population and high levels of urbanization have increased the demand for urban services in the region, including appropriate solid waste management. Construction and demolition (C&D) debris represents a major component of municipal solid waste in the Gulf region. For example, 45-50 percent of the UAE solid waste consists of C&D debris, and about 60 percent of this is generated in Dubai. The amount of C&D waste collected in Dubai is increasing every year by nearly 20 percent especially because of the rising trend in construction, renovation, demolition of old structures, and reconstruction or expansion of the road transportation network in Dubai. Detailing the most significant environmental threats brought on by inappropriate management of C&D is worthwhile, since most GCC countries avoid mentioning them in their NES/NEAP. It is crucial for the UAE to integrate strategies to deal with problems of C&D waste disposal in their plans to ensure the protection of the environment. I am pleased to present in this issue the paper which won the first place in the Environmental Day Student Paper Competition held on February 22, 2007 at the American University of Sharjah. The paper was prepared by two young girl students which proves that the new generation is pretty much aware of the emerging environmental threats.

Abdulaziz Sager
Chairman, Gulf Research Center

Issue No. 2, April 2007

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# Current Concerns of C&D Debris: The Environmental Case of Dubai

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Due to the immense quantity of C&D waste generated and collected since the start of the construction boom period, there is adverse environmental impact on the population in Dubai which will indirectly affect the economy, public welfare, aesthetics and tourism. The heavy dependence on landfilling as the only disposal option for C&D waste management in addition to the lack of adequate treatment facilities for such substantial amounts of waste are two pressing issues that need to be addressed. This paper focuses on the current status of C&D waste management in Dubai. Moreover, various environmental impacts due to C&D waste generation, storage, collection, disposal, treatment, and recycling are identified, and potential solutions are proposed.

## I Environmental Threats of C&D Waste

In a recent report issued by the United Nations Development Program (UNDP), it is estimated that diseases related to inadequate waste disposal systems have fatal effects on more than five million people each year. In addition, many adverse environmental impacts which are caused by inappropriate C&D waste management have been reported (Ahmed & Rashed, 2006). Some of these direct and indirect effects are listed and discussed below:

### 1. Groundwater contamination due to land disposal of C&D waste

The contaminating effect of C&D waste disposal on the quality of groundwater can be classified into two categories (Townsend & Kibert, 1998):

- Contamination with hazardous chemicals, organic compounds or heavy metals.
- Contamination with nontoxic chemicals that has the effect of degrading the quality of groundwater resources.

### 2. Health risks of hazardous C&D waste

- Disposed asbestos containing materials:
  Asbestos can easily become hazardous when it is disturbed through unsafe demolition procedures causing the asbes-

**Table 1: Typical Construction Operations: Materials Used and Hazardous Wastes that May Be Generated** *(Source: EnviroScience 1996)*

| Process/Operation | Materials Used | General Types of Waste Generated |
|---|---|---|
| Paint preparation and painting | Paint thinners, enamel, reducers, paints, lacquers, epoxies, acrylics, primers, solvents | Ignitable waste, toxic waste, spent solvents, paint waste |
| Carpentering and floorwork | Adhesives, solvents, polishes and varnishes, treated wood | Spent solvents, toxic waste |
| Other specialty contracting activities | Adhesives, paints, coatings, polishes, varnishes, solvents, petroleum products | Ignitable waste, toxic waste, spent solvents |
| Heavy construction | Motor oil and other petroleum products, asphalt | Used oil, asphalt waste |
| Wrecking and demolition vehicle and equipment maintenance for construction activities | Degreasers and cleaners, motor oil and other petroleum products, solvents, rust removers | Wreckage and debris that may contain ignitable or toxic substances, used oil, spent solvents, acid/alkaline waste, ignitable waste, toxic waste |

tos fibers to become suspended in air. Therefore, those who are in contact with released asbestos dust in the work place are at immediate risk to many serious health problems. Diseases caused by asbestos inhalation include: Asbestosis, Mesothelioma, Cancer, Asbestos wart, Pleural plaques, and Diffuse pleural thickening (Wikipedia, 2007).

- Other hazardous construction waste:
  While asbestos containing materials are recognized as the most significant of hazardous waste, other considerable hazardous waste that might be generated during construction and demolition processes are presented in table 1.

### 3. Other noteworthy environmental impacts due to inappropriate C&D waste management include

- Destruction of aesthetics and visual quality
- Dust generation and transmission
- Production of foul odors due to decaying of waste
- Propagation of pests, rodents, and disease causing organisms
- Noise generation
- Distortion of topography, geology, and landscape
- Impact on terrestrial and marine ecology
- Distortion of recreational potentials resulting in a reduction of tourism
- Leachate and landfill gas generation and dispersion
- Occurrences of unexpected fires (Ahmed & Rashed, 2006)

Even though C&D waste has been identified as imposing lower threat levels on human health and the environment compared to other municipal solid waste, the threats discussed above are worth recognizing.

## II Recycling vs. Landfilling

There are two main options currently applied in the UAE to manage C&D debris: landfilling and recycling. Due to sufficient land availability, landfilling has served the UAE for much longer than any other waste disposal option. Table 2 displays a

**Table 2: Landfilling vs. Recycling** *(Source: Department of the Environment and Welsh Office, 1995; Williams 1998)*

| Disposal Option | Landfilling | Recycling |
|---|---|---|
| **Advantages** | ▪ A broad variety of wastes are suitable for landfilling.<br>▪ It remains the final destination for some deposits arising from other waste management options (for example, ashes from incineration processes).<br>▪ There is an opportunity to collect and utilize landfill gases to generate low polluting fuel.<br>▪ Landfills can be reclaimed and restored after their life cycle to provide space for other construction projects such as wildlife and leisure activities.<br>▪ If the landfill is well-designed, undesirable features may not be noticed. | ▪ Conserves landfill space.<br>▪ Reduces the cost of landfilling and tipping fees.<br>▪ Reduces the cost of landfilling and tipping fees.<br>▪ Reduces overall building project expenses through avoided purchase/disposal costs (EPA U.S., 2006).<br>▪ Reduces the environmental impact of producing new materials by decreasing the use of natural resources and harmful toxins generated the in the process of creating new construction material.<br>▪ Reduces mineral extraction.<br>▪ Recycled material are proven to be both durable and of good quality in all respects.<br>▪ Reducing traffic congestion and transportation costs. |
| **Disadvantages** | ▪ Both economically and environmentally costly.<br>▪ Contamination hazards from operational landfills.<br>▪ Scarcity of suitable landfills.<br>▪ Uncontrolled leakages are a source of leachate and landfill gas pollution.<br>▪ Contributes to low useful energy generation.<br>▪ The essential simplicity of landfilling discourages research and development in waste management techniques.<br>▪ May destroy the value and therefore the future use of the land.<br>▪ Sound, odour, sight, and vehicle movement disturbances. | ▪ Possibility of high levels of heavy metal presence such as arsenic in recovered screened material (RSM) |

qualitative comparison between these two alternatives. This table proves that recycling is a better choice of C&D waste management for our environment. Recycling offers long term advantages that are valuable in terms of energy and natural resources, while landfilling seems to be a convenient and rather temporary solution to C&D waste management. The high rate at which C&D waste generation is increasing each year triggers calls for better management of waste in Dubai to protect and preserve the environment, water and habitats of species, and to reduce contamination of land. Enhancing existing recycling methods will serve this vital purpose.

## III New Recycling Plant

Dubai municipality operates landfills at five different locations in the Emirate. While Municipal Solid Waste (MSW) is landfilled at three of these sites, there is only one exclusive site for the disposal of C&D Waste. The Dubai government has recently initiated a strategy to privatize parts of its MSW collection and management services including C&D waste. The companies involved in collection of C&D waste in Dubai accounted for 49 percent of the general waste collected in Dubai in 2003 and 53 percent in 2004 (Globe-Net, 2007).

One of many recent efforts in 2006 to manage C&D waste was the signing of a contract between Dubai municipality and Southwest Middle East, a specialized privately-funded company to launch the largest C&D waste treatment plant in Dubai. This new recycling plant is serving to minimize C&D waste, utilizing the most advanced technology not only in the Gulf Region but also in the Middle East, to assure the relatively safe disposal of C&D waste and the recycling of 60-70 percent of its components.

**Table 3: Production of the New C&D Recycling Plant**

| Item | Quantity/Tons |
|---|---|
| 10 mm aggregates | 702.55 |
| 20 mm aggregates | 386.16 |
| 50 mm aggregates | 117.70 |
| Asphalt | 30,322.24 |
| Black sand | 794.63 |
| Mix | 55.00 |
| Sub-base | 13,386.41 |
| Total | 45,764.69 |

Southwest Middle East, located on the Oman-Hatta freeway, has an estimated total monthly production of 68,647 tons of recycled construction materials, including but not limited to 10, 20, and 50 mm aggregates, asphalt, black sand, and road sub-base. Table 3 shows the quantity of recycled materials produced in January 2007.

As can be seen from the table, the plant's recycling processes are only focused on concrete and asphalt re-production. The steel rebars removed from the cracked concrete are not being handled in the plant itself, but are transferred to steel treatment plants in Jebel Ali Port. The recycled asphalt is used mainly in the construction of temporary roads on construction sites, and the recycled aggregates are used as road sub-base. Other companies that have benefited from the plant's recycled materials in their projects are Al-Naboodah, Sharp Line China State Construction, Bushager, Al-Futtaim, FALA, ADMAK, Al Kharafi & Sons, JASF, and Omart Saleem Trading.

The amount of recycled material produced in the plant is merely a small reflection of the total C&D waste collected in the Dubai Municipality tip and other tips around the Emirates. This portrays the cooperation that is required between the public and private sectors in the UAE to promote a better disposal of C&D waste.

## IV Potential Solutions for Better C&D Waste Management

While first world countries have definite specifications for C&D debris management, the Dubai government makes no provisions for the disposing of such debris. Waste management methods are not integrated in Dubai since all construction companies are managing the waste within their own specifically defined authority. Listed below are some general actions that can be taken to encourage, expand, and produce innovative techniques to manage C&D waste by Dubai Municipality in addition to public and private construction companies (Voronova, 2006):

### 1. Primary solutions

- Forming and executing a national communication policy on C&D waste management
- Communicating the advantages of "green buildings" and their long term benefit in reducing maintenance costs
- Evaluating and awarding buildings that meet green building standards in order to motivate contractors

- Executing extensive studies in order to assess markets for recovered C&D waste materials
- Reviewing existing studies or reports conducted on C&D recycling and identifying research needs
- Recording possibilities for recovering engineered construction products such as gypsum drywall and asphalt shingles, and researching proper lead-based paint management methods
- Incorporating model specifications for C&D recovery and recycling with construction and renovation project contracts
- Necessitating requirements related to C&D recycling in issued building permits
- Facilitating the process of getting permits for companies that use green materials
- Publicizing specifications and guidance documents. Standards formulated in other countries can be a guideline for development of specifications in our country
- Initiating case studies of prosperous projects in C&D recycling and recovery
- Including specifications for deconstruction processes
- Implementing strict quality control procedures. Specifically, controlling asbestos containing materials
- Strategically determining the location and state of the asbestos containing materials
- Always assuming that a material may be contaminated with asbestos unless the opposite is proven
- Evaluating the risks involved with inhaling asbestos fibers, and planning a management strategy

### 2. Secondary solutions

- Utilizing waste reduction techniques during construction:
- Production planning and sequencing
- Substituting raw materials with materials that have low waste generation
- Equipment enhancement or modification
- Obligating C&D recycling for federal-funded construction, renovation, and demolition projects, and imposing fines in case of violations
- Conducting the Toxicity Characteristic Leaching Procedure (TCLP) analysis to determine the presence of hazardous C&D debris
- Providing facilities for groundwater monitoring to predict contamination
- Stimulating large and small investing companies to develop novel technologies for C&D recycling
- Enforcing local landfill bans as a policy for increasing C&D recycling
- Educating contractors and builders about the substantial C&D recycling saving opportunities
- Expanding existing recycling programs

## Conclusion

In summary, the main obstacles due to which landfilling has become the most commonly applied disposal method in the UAE are:

- Deficiency of performance-based specifications that have been proven to be successful
- Absence of testing to ensure that recycled construction materials satisfy performance requirements
- Insufficiency of research studies on C&D waste management.
- Low landfill tipping fees
- Poor image associated with recycling activities
- Problems associated with breaking into and competing with virgin material markets

The present day challenge in the UAE is to move from the conventional system of C&D waste management towards a more incorporated and sustainable waste management system that takes environmental issues into account. If responsibilities are left to self-motivated efforts of people and business projects, it will be difficult to fully protect the environment. For this reason, in response to the problem of pollution and environmental damage, various regulatory measures must be implemented. The time has arrived to give priority to sustainable development and prevention of environmental pollution. Recycling of waste from the construction industry achieves this objective, and only coordinated efforts can develop this activity into a better booming industry.

# Biodiversity – A Gulf Region Perspective

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Like water, air and soil, Biological Diversity is the hub of the wheel of life. Life as far as known by man, is the unique aspect of our planet in the solar system. Life in all forms is included in the word 'biodiversity.' Plants, animals, various ecosystems and microorganisms all are a part of it. This variety is responsible for the building blocks to adapt to changing environmental conditions in the future and keep a balance between all living and non-living forms.

"Biodiversity" is often defined as the variety of all kinds of life, from species to their distinctive genetic composition, through to the broad scale of ecosystems (Gaston 1996).[1] "Biodiversity" was coined as a contraction of "Biological Diversity" in 1985, and the new term arguably has taken on a meaning and importance of its own. A symposium in 1986, and the follow-up book Biodiversity (Wilson 1988),[2] heralded the popularity of this concept. In very plain terms, global biodiversity is the total web of all living things and ecosystems – everything from whales to warblers, and including humans, deserts, forests, wetlands, mountains, lakes, rivers and agricultural landscapes to coral reefs.

The biodiversity we see today is the result of billions of years of evolution. The Gulf region is home to one of the most fascinating ecological frameworks in the world. It has been blessed with a spectacular spectrum from the under water world to amazing species in the desert. It is home to both typical Asian and African species. This region is home to a rich marine life with large populations of eight species of Dolphins, and four out of the world's seven species of turtles including the "Green Turtle". This body of water provides a haven for several commercially important fishes due to its sea grass beds. There is significant presence of mangroves in this region quite important to the local fishery. Thirty-two species occurring in the UAE – 16 of bird, 13 of mammal, two of reptiles and one of fish – are listed in the IUCN Red List of Endangered Animals and Plants, 2000.[3]

Coral reefs form another very vital component of marine life in the Gulf Region. They are as much a part of Arabia's natural heritage as the deserts and Bedouin way of life. The entire Arabian Peninsula is fringed by some of the most beautiful coral reefs in the world. Like the animals and plants of the desert, the coral reefs are sensitive to harsh conditions and unnatural disturbances, the most destructive ones unfortunately caused by humans. Coral reefs are polluted with sand from dredging, with sewage, oil and chemical wastes, not to mention unplanned over fishing. In the last few summers, the rise in water temperature as well as land reclamation and dredging have led to massive coral bleaching.

Considering that the Gulf region is home to such rich biodiversity, sadly, not much is being done to preserve it for the future generations. On the contrary, the two Gulf wars and commercial development have posed grave environmental threats. One major threat which cannot be ignored is oil spills, which the world witnessed during the two Gulf wars. During the first Gulf War from the fall of late 1990 to early 1991, Iraq embarked on a systematic destruction of Kuwait's oil industry, and Iraqi forces set fire to approximately 800 individual Kuwaiti oil wells. The results were catastrophic both from an economic and ecological standpoint. The ecological landscape of Kuwait and the Arabian Gulf was irrevocably damaged due to the destruction unleashed by the burning oil wells, and it may be generations before this environment is restored to its pre-war balance.

At the beginning of the above crisis and the recent Gulf war, little attention was devoted to the potential impact of a sustained war on the regional environment. However, many environmentalists and concerned scientists soon began to discuss the potential ramifications of such activity, and it is estimated that the burning of millions of barrels of oil per day for an extended period would effectuate environmental hazards of a magnitude greater than any prior man-made environmental disaster. It is anticipated

1 K. J. Gaston (ed.), *Biodiversity: A Biology of Numbers and Difference* (Oxford: Blackwell, 1996).
2 E. O. Wilson (ed.), *Biodiversity* (Washington: National Academy of Sciences/Smithsonian Institution, 1988).
3 International Union for Conservation of Nature and Natural Resources, *Species Survival Committee Report, 2000*, www.iucnredlist.org

that the blanket of soot and smoke produced shall be enough to cover half of the northern hemisphere. The total cost of all environmental damage after only the 1991 Gulf war was estimated at $40 billion. Unfortunately, the world cannot even begin to assess the damage and devastation caused by the recent ongoing conflict in the Gulf.

The damage is not only to the ecosystem nor is it limited to being monetary only. Soon the Gulf Region could be faced with a water crisis. One complicating factor is that there is very little flow of fresh water into the Gulf seas because of the lack of rain in the region and the absence of surface water bodies like rivers, ponds and lakes. The Gulf countries depend heavily on seawater desalination for their drinking water. Unfortunately, unabated oil spills by military and commercial vessels has polluted the Gulf waters to the extent that soon it will be impossible to treat. Activities like offshore oil extraction, and leaking old ships that pass through these waters, are all causes of marine pollution, combined with unaccounted dumping of hazardous toxic waste and sewage into the sea water. The destruction of sewage treatment plants, as a result of the military activities resulted in the discharge of over 50,000 $m^3$ of raw sewage every day into Kuwait Bay. In most cases, the water cycle tends to preserve environmental balance but that too is a very slow process. It takes almost five years, at least, for an ecological balance to be restored.

The extent of coastal development in the various Gulf countries is now largely contributing to the disappearance of key resources and habitats such as mangroves and corals

The destruction and havoc caused by military activities is one side of the coin. Rapid population increase and changes in lifestyle have contributed to the degradation of wetland ecosystems due to increased exploitation of surface and groundwater. Dubai has lately embarked on an ambitious plan by building a number of artificial islands. These islands, which will house luxury residences, villas, and hotels, are a growing concern for environmentalists due to their impact on the local marine ecology. Physical alteration of habitats, climate variability and alien species introduced into the water are responsible for the deterioration of the natural habitat. The extent of coastal development in the various Gulf countries is now largely contributing to the disappearance of key resources and habitats such as mangroves and corals. The Gulf countries need to be concerned about the long-term viability of the commercial plans as global climate change could spell trouble for its investments. It is quite ironic that the very people who drive rising sea levels through their businesses, which emit much of the world's greenhouse gases, will undoubtedly be some of the first to experience the devastating effects of climate change.

It is now abundantly clear that coastal and marine biodiversity is threatened by several human activities including pollution (oil spills, industrial and domestic discharges into the sea) in the Gulf region. The key question is what can be done about it? Most countries including Oman, Qatar, UAE, (but with the exception of Kuwait) have ratified the Convention on Biological Diversity (CBD) 1992. In addition, some have ratified other biodiversity-related conventions such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and The Cartagena Protocol on Biodiversity. Countries are also adhering to other international and regional agreements such as the Mediterranean Action Plan (MAP) and Regional Organization for the Protection of the Environment of the Red Sea and Gulf of Aden. In addition, the establishment of protected areas in West Asia has been gaining momentum. Muscat had the opportunity to host a regional workshop on protection of biodiversity on May 29, 2006[4] with the aim of protecting the declining biodiversity landscape in the Gulf and meet the region's obligations under pertinent international and regional legislations.

The world is familiar with many a conference which aims to devise strategies in concerned areas. However, it is a well known fact that pieces of legislation cannot prevent individual nations from violating international laws and subsequently causing irrevocable damage to nature and its habitants. What is needed is a realization and will on the part of the states and their policy makers that like water, air and soil, biological diversity is the hub of the wheel of life. Destroy it, and the wheel, however technologically sophisticated, will no longer run. It is hoped that the world will soon wake up to this fact and humans will start learning all over again how to live on planet earth.

4 *Times of Oman*, May 30, 2006.

# Green Buildings: Resource-efficient and Environment-friendly

Meena S. Janardhan
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Environmentalists across the globe have been crying themselves hoarse about the need to stem developmental patterns that are sounding the death knell for the earth's finite resources and propagate solutions that will promote the concept of sustainable development, use renewable energy sources and reduce the stress on our fragile environment.

In every country, skylines are getting increasingly crowded and dotted with towering high-rises and teetering structures. Rapid and unplanned urbanization and growing cities are polluting our natural resources to unimaginable extents as more than half of the world's population has resorted to living in cities and towns.

According to studies conducted by the Intergovernmental Panel on Climate Change based in Geneva, Switzerland, in 1990, the residential, commercial and institutional building sectors consumed 31 per cent of global energy and emitted 1900 mega tons of carbon and by 2050, this share may rise to 38 per cent and 3800 mega tons, respectively.

It is in this context that the concept of 'sustainable' or 'green' designs for buildings becomes extremely important. A 'green' building involves a successful intermix of user comfort, productivity and minimal environmental impacts. The introduction of an 'eco-design' at the initial stages of planning ensures that such ecological architecture would leave the least environmental footprints and include the principles of conservation and efficient utilization/recycling/reuse of limited natural resources.

The end-result would, therefore, be a building that leads to minimized destruction of natural areas, habitats, biodiversity, and soil fertility; reduced air/water pollution (with direct health benefits; optimized water consumption; limited waste generation (through recycling/reuse); increased user productivity; and enhanced image and marketability.

Research indicates that the highest energy consumption in buildings is for air-conditioning/heating and lighting – about 50-60 per cent of the energy consumed in a fully air-conditioned building is by air-conditioning followed by lighting (20 per cent).

In old buildings, the adoption of energy-efficient options could reduce energy consumption by almost 20 per cent. In new buildings, by the incorporation of such design interventions right from the beginning, energy consumption can be cut down by nearly 50 per cent. These energy-saving features are, of course, more expensive than traditional ones, but that investment is offset by the enormous saving potential over the years.

## Heightened 'Green' Responsibility

Environmental consciousness runs high even in an oil-rich country like the United Arab Emirates (UAE) and the construction sector has also jumped on to the bandwagon. The UAE's architecture and design community is strongly pushing for the creation of an urban design review board, the existence of which would usher in more eco-friendly buildings. One outcome of this heightened 'green' responsibility has been the setting up of the Emirates Green Building Council, which would soon have a leading role to play in changing the

**LEED Certification Levels** *(Source: USGBC)*

| Rating | Earned points |
|---|---|
| Certified | 26–32 |
| Silver | 33–38 |
| Gold | 39–51 |
| Platinum | 52–69 |

mindsets not only among the experts, but also among all the other players who are closely involved with the rapidly booming construction sector.

"To many people green buildings are something that only scientists and environmentalists talk about, but this is no longer true. It is a process that will take some time, but we are slowly gaining ground," said Mario Seneviratne, Director of Green Technologies Company, Dubai, "A green building must show sustainability, use of environment-friendly materials, save energy and utilize water harvesting/saving devices. Some 47 per cent of energy-saving measures in a green building is related to heating, ventilation and air conditioning."

Seneviratne adds, "Most architects and engineers in the UAE are either advertently or inadvertently incorporating one or more of the five prerequisites for a green building – sustainable sites, energy efficiency, water-use efficiency, environment-friendly materials and indoor environmental quality. It is now our task to get them to incorporate all five aspects into one building and develop a holistic approach. There is some initial reluctance, of course, but that will soon be overcome when they realize the benefits. One of the first projects pursuing this approach is the new US embassy in Abu Dhabi."

Another eco-design project that has been successfully completed is the district cooling plant in Dubai's leading mall Wafi City, which is the first building in the Middle East to have been awarded the silver 'Leadership in Energy and Environmental Design' or LEED certificate.

Developed by the US Green Building Council (USGBC), the LEED certification program is a voluntary, consensus-based national standard for developing high performance, sustainable buildings. LEED provides a framework for assessing building performance and meeting sustainability goals and recognizes it through its rating system.

According to Seneviratne, a certified LEED engineer whose company was responsible for the engineering and project management of this plant, the project highlight was the construction of an 8100-ton chilled water plant on a land area that was previously used to generate 720 tons of cooling. The plant also utilizes energy-efficient chillers and environment-friendly refrigerants, improving energy efficiency by more than 25 per cent over international standards.

There is more – the regional headquarters of Pacific Control Systems (PCS), based in Dubai's Techno Park, received, a 'platinum' LEED certificate recently and is one of the 16 buildings across the world to make that grade. This is Dubai's first and totally 'green building' that combines energy efficiency, minimal environmental impacts and waste reduction with state-of-the art technology.

"Our green building initiative is in line with our commitment to the Dubai government's drive towards achieving sustainable environmental protection, and we fully support the corporate social responsibility of the UAE government," said Dilip Rahulan, PCS Chairman and Chief Executive Officer.

The PCS building spans over 120,000 square feet and adopts energy-saving devices that reduces energy loads by using 100 kW of solar-powered lighting and 100 tons of solar-powered air-conditioning. The aim is to save nearly 35 per cent on energy usage and 40 per cent in water consumption on the one hand, and provide better indoor air quality, health and productivity on the other.

**LEED Building vs. Conventional Building** *(Source: USGBC)*

| LEED rating (energy, water, land improvements, etc.) | Anticipated energy/ environmental impact (%) |
|---|---|
| Certified | 30 |
| Silver | 40 |
| Gold | 50 |
| Platinum | 70+ |

Other green features are soil erosion measures, water-efficient equipment, solar-thermal air conditioning for fresh air requirements, high-efficiency chillers, solar photovoltaics for building lighting, state-of-the-art building management system, use of materials with high recycling content, variable speed drives for centrifugal fans and pumps, CO2 monitoring for indoor air quality, low volatile organic compounds in carpets, adhesives, sealants and paints, and use of environment-friendly housekeeping chemicals.

The next building to follow eco-design principles will be the headquarters of Metito, a leading company involved in water, wastewater and desalination treatment projects, which is currently under construction at the Dubai Techno Park. This

green building will also merge the principles of sustainable development with high-end technology.

The chief green features of this building will be wastewater recycling technologies, water conservation fixtures, water-efficient landscaping designs, optimal energy performance, chlorofluorocarbon reductions, CO2 emissions monitoring, low-emitting building and finishing materials, thermal comfort control maintenance and indoor air quality management planning during construction and before occupancy, among others.

## II Last Word

Buildings and other habitats are designed and constructed to meet the basic human need for shelter. Rather than isolated, independent components, buildings are integrated systems that interact with their environments. However, it is highly inappropriate that fulfilling human needs today means depleting the global green cover, water sources and other precious natural resources.

Most conventional design and construction approaches develop buildings in a vacuum as if nature does not exist and very often architectural expressions demonstrate human dominance over nature. Sustainable approaches, on the other hand, demand restraint and advocate the cautious use of natural resources. We urgently need to identify the causative reasons behind unsustainable design, through different stages of building life cycle and resort to measures to address these concerns.

**Reduced Energy Use in Green Buildings as Compared with Conventional Buildings (%)**

| Energy use | Certified | Silver | Gold | Average |
|---|---|---|---|---|
| Energy efficiency | 18 | 30 | 37 | 28 |
| On-site renewable energy | 0 | 0 | 4 | 2 |
| Green power | 10 | 0 | 7 | 6 |
| Total | 28 | 30 | 48 | 36 |

It is, therefore, extremely essential that we adopt and promote sustainable building design as it is an integrated approach to building design that minimizes the negative impacts of buildings on our fragile environment. Eco-housing concepts that result in green buildings are definitely the need of the hour.

**Wafi City is an example of green buildings in Dubai**

# ‘Desalination’ vs. the ‘Environment’ A Knock-out Contest?

Mark Silverton
Environmental Consultant, WSP Middle East (Environmental)

The world needs water. From the provision of water fit for human consumption through to the water needed for various industries and agriculture, humans are necessarily dependent on obtaining suitable sources of that most fickle of compounds, H2O. Estimates of the total freshwater available for ecosystems and humans vary, but an educated guess puts it at 200,000 $km^3$ (Gleick, 1993; Shiklomanov, 1999: used by UNEP) or less than 1 percent of worldwide freshwater resources and less than 0.01 percent of all the water on earth.

Ease of access to usable sources of water varies, of course, between different global regions, and, indeed, within the borders of individual countries. In regions, such as the Middle East, demand is often several times more than available supply whereas regions such as North and South America overall have comparative water wealth. Given the population increases that many countries are experiencing, this demand will only increase in the long term. For those water short areas, the solution is, often, to use water ‘locked’ underground in aquifers to supplement surface resources, such as rivers, that the country might have. However, the utilization of groundwater at a rate in excess of the natural recharge rate can result in depletion of the aquifer and often results in salt water ingress which, in turn, can render it unusable as a potable water supply. This can have serious consequences for ecosystems dependent on the water and for future water availability. The natural solution for those countries with no natural water supply but fortunate enough to have a coastline would seem to be the utilization of that most abundant of resources – sea water. However, as this brief article suggests, this solution may not be quite the panacea it may at first appear to be.

The process of desalination is, as the name suggests, the removal of the salt from water. The means by which this is done can largely be broken into two main types of process: thermal or non-thermal processes. The thermal processes, using a variety of methods, effectively heat the seawater and collect the pure distillate for use. Non-thermal processes, as the name suggests, try to achieve the same outcome using a different method with the most common being reverse osmosis which basically uses pressure to force water through a membrane to separate the salt from the water.

Commercially, as is common with most large industry, the cost of producing a unit of water falls as the scale of the production increases, encouraging the creation of ever-increasing plant dimensions. At present, the thermal technologies of Multi-Stage Flash (MSF) and Multi Effect Distillation (MED), typically lend themselves to the scaling up of their plant sizes, with large facilities being able to produce in excess of 250,000m3 of potable water a day and the largest, in Saudi Arabia, topping 1,000,000 $m^3$ a day. To date, the largest Reverse Osmosis (RO) plant in comparison can produce around 300,000 $m^3$ a day. As these figures suggest, these plants are an order of magnitude away from small desalination units that people may be aware of. Just one desalination unit from one of these mega desalination facilities can be more than 100m in length – longer than most football pitches – and require giant barges and cranes to move and install. A large facility can have more than 10 of these units.

Desalination also uses an enormous amount of energy to split the water from its salt compatriot. For this reason, many of the larger plants co-exist with power generation facilities of a corresponding size in order to both utilize the energy for desalination and transport the electricity for commercial and domestic use – for example, a large plant producing 2400MW of electricity – effectively enough by itself to power around two and a half million homes. The scale and size of these facilities necessarily require large infrastructural investments, from the creation of electricity and water distribution networks through to the planning of surrounding roads, accommodation and wastewater

for the associated labor force which can be in the thousands especially during construction.

All this development naturally occurs close to its main dependent resource, seawater and along the ecologically sensitive coastal zone. The location of the installations in some of the most biologically diverse and productive ecosystems in the world, naturally, has repercussions. Desalination facilities, especially when combined with the cooling water requirements of associated power stations, use an enormous amount of water and discharge this water back to its origin – the sea. However, the very process of purifying the sea water can have the opposite effect on the water released back to the sea. The discharged water can typically be at least 7 or 8 degrees Celsius warmer than the surrounding ocean, have an increased salinity and residual chlorine, and contain many other elements used in the desalination process from descalants through to potentially heavy metals from the corrosion of facility equipment by the caustic seawater. A recent estimate in 2006 suggested that desalination plants introduce more than 19,000 kg of chlorine and 55,000 kg of antiscalants into the Arabian Gulf per day. All these factors, if not properly managed, can seriously alter this sensitive biologically important region.

> The process of desalination is, as the name suggests, the removal of the salt from water. The means by which this is done can largely be broken into two main types of process: thermal or non-thermal processes

A small rise in temperature can cause the bleaching of sensitive corals which ultimately leads to the death of the coral community including associated fish, invertebrates and specialised coral algae. While this effect may also be caused by sea temperature rise resulting from global warming (for example recent reports relating to the Belize World Heritage site), the environmental impact of the cooling water can be exacerbated by the additives including chlorine and descalants. A few extra parts per million of sodium chloride can cause a fish population to migrate to less saline waters. It is important to note too, that these individual population changes will certainly have further impacts on populations that depend upon these species in one way or another. A lack of residual monitoring and restriction for chlorine, one of the most potent biocides used regularly in many forms of water treatment today, can lead to large scale biological destruction. Furthermore, given the levels of water intake and discharge that these facilities sustain, the very process of taking up and discharging the water becomes a potential issue. In order to fulfil the needs of desalination (and cooling) the water required needs to have minimal suspended solids and to be kept at a constant velocity.

The large volumes of cooling water required by the facilities require an intake channel approaching the size of a small river, some tens or even hundreds of metres wide, with a discharge outfall channel being of a similar magnitude. Clearly such a structure requires a similarly proportioned engineering feat – whether through several giant pipes or by the creation of a large dredged channel, often extending several kilometres into the open sea. The construction of these intakes and outfalls can entail the destruction of a relatively large area of potential habitat, with the maintenance of an open channel by continual dredging ensuring that the habitat is not conducive to becoming a new habitat.

In addition to the impacts in the marine environment, air emissions from the plant can be significant, especially if a power generation facility is attached. Dependent upon the type of fossil fuel a plant uses, emissions can range from sulphur dioxide, which can cause breathing irritation and contribute to acid rain, through to Nitrogen Oxides (or NOx) which can also cause breathing difficulties or be used in the formation of ozone, also detrimental to human health when at low altitude.

The immediate operational impacts are not the only concern. It is important to address the potential associated impacts that such developments can have. For example, there is likely to be increased traffic levels, especially during construction, but also throughout the lifetime of the plant, with significant numbers of people being employed and needing transport to the site. All the traffic-related issues such as congestion, traffic pollution and so on also need to be taken into account. On the positive side, however, there are significant socio-economic benefits for local communities with additional employment opportunities resulting from the new plant.

All this is not to say that such developments should not take place. The development of crucial infrastructural resources such as water availability, production and electricity is vital for a

country's continued advancement. What is suggested, however, is that careful consideration needs to be made with regard to the potential impacts that a project may have. Although this is true for all developments, projects of the size and potential impact of desalination plants necessitate a full understanding of the existing conditions in order to design methods to mitigate potential impacts as far as is possible. The issues which need to be considered should be as wide ranging as the potential impacts; from the direct impact of plant design through to the long-term impacts of emissions, maintaining the plant, impact upon local communities and so on. The involvement of local communities, businesses and other organisations can help in the understanding of such a wide range of issues and the wider participation of interested parties can also help manage potential factors.

The level of water demand in dry arid environments, such as the Middle East, is only likely to be alleviated, at least in the short to medium term, by desalination. The product of these plants is essential to support healthy economic growth which has provided enormous benefits over the past 30 years throughout the Middle East and improved quality of life for citizens and visitors to the region. However, what should be noted is that there is a potential, as with all large developments, for significant impact upon the local, regional and even the national environment.

These impacts can, if properly assessed through internationally accepted environmental assessment requirements, such as the Equator Principles, be effectively mitigated providing substantial economic, social and environmental benefits – a "win, win, win" situation for all.

# Impact of Climate Change on GCC Countries

Dr. Mohamed A. Raouf
Senior Environment Researcher, Gulf Research Center

*"Mischief has appeared on land and sea because of that the hands of men have earned. That (Allah) may give them a taste of some of their deeds: in order that they may turn back".* Holy Quran - Surat Alroom, Ayah 41.

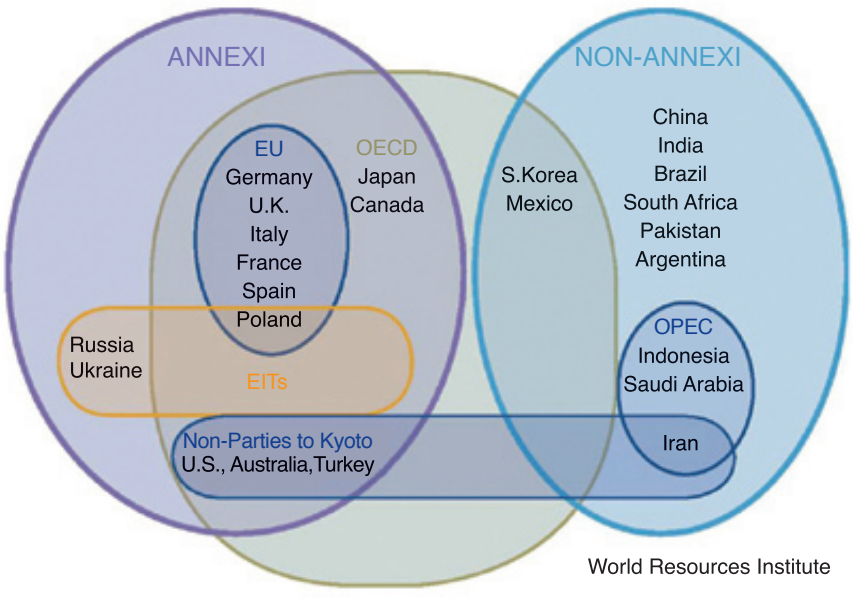
There is no doubt that the planet today is suffering from very negative environmental impacts as a result of the different development activities on land, and in the past 50 years, on sea as well. Seas suffer a lot as a result of offshore oil and gas exploration, production and transportation, as well as resorts and so on. It is amazing that the word "earn" in the above Surat means that man undertakes development activities for the welfare of humankind but this has both negative and positive outcomes.

It is not surprising to note that the Kyoto Protocol related to the United Nations Convention on Climate Change (UNFCCC) has called for and is now trying to ensure that out of the 166 countries which have ratified the protocol, 40 should turn back and reduce the Green House Gas (GHG) emissions by 5 percent from the level of emissions of year 1990. Many of these countries have not yet fulfilled their obligations under the convention. Countries like the US and Australia have not ratified the protocol and do not have the intention to ratify even though the US contributes about 30 percent of the GHG emissions.

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP). Recently, the Panel released the first of four reports that will be published in 2007 as part of its Fourth Assessment Report (4AR). The IPCC's Working Group I, looks at the science of climate change. According to this report:

- It is very likely that human activities are causing global warming
- Probable temperature rise by the end of the century will be between 1.8 Celsius and 4 Celsius
- Possible temperature rise by the end of the century ranges between 1.1 Celsius and 6.4 Celsius
- Sea levels are likely to rise by 28-43cm
- Arctic summer sea ice is likely to disappear in the second half of the century
- It is very likely that parts of the world will see an increase in the number of heatwaves
- Climate change is likely to lead to increased intensity of tropical storms

**Top 25 GHG Emitters by Region and Organization**



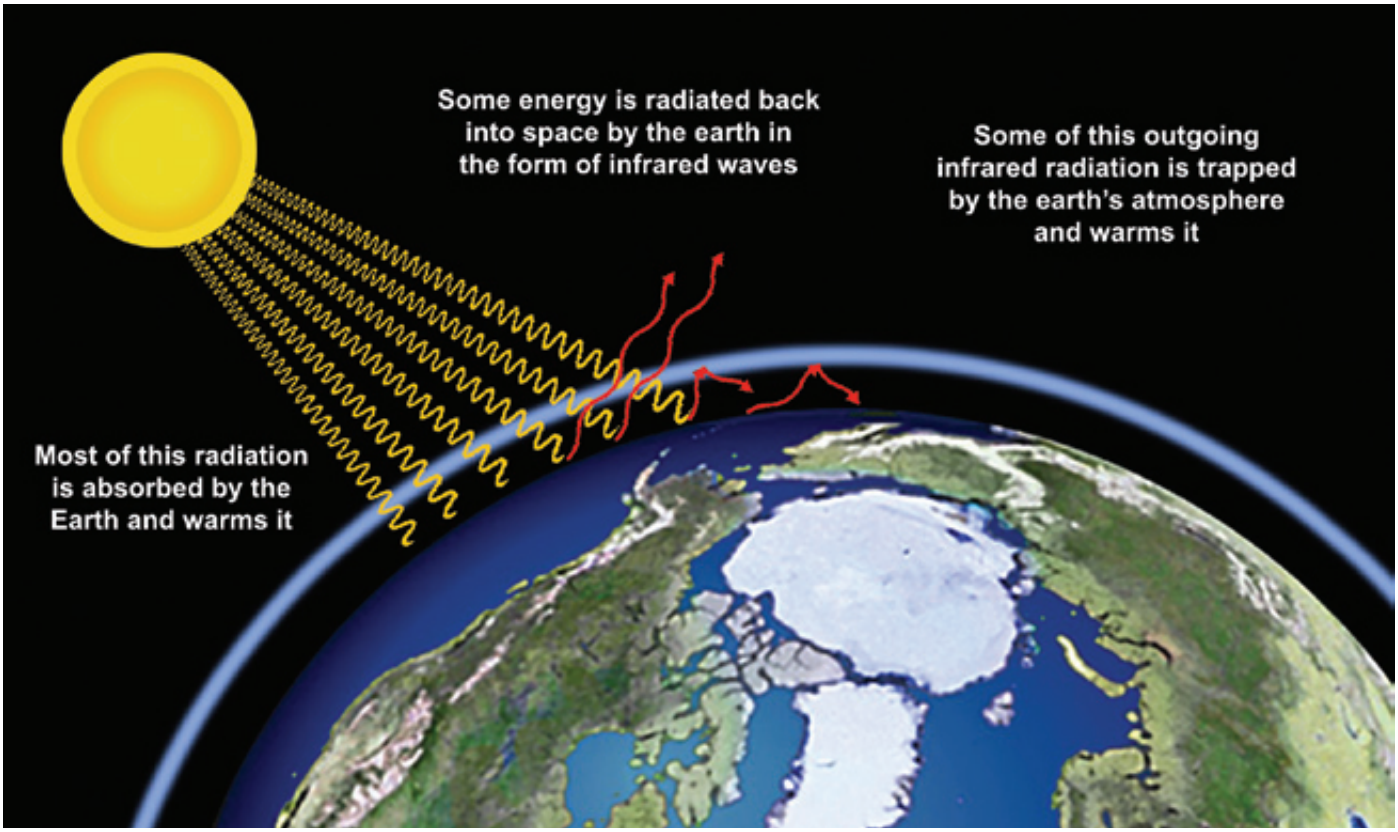
The Gulf region only contributes about 2.4 percent of the GHG emissions. However, the climate change impact is global so coastlines across the region may suffer in the next 50 to 100 years if countries do not make the most of the incentives on offer to oil-producing countries by the United Nations to bring down their carbon emissions. The Gulf region especially is the main producer and exporter for fossil fuels which is the main reason for CO2 emissions. CO2 accounts for 55 percent of GHG gases.

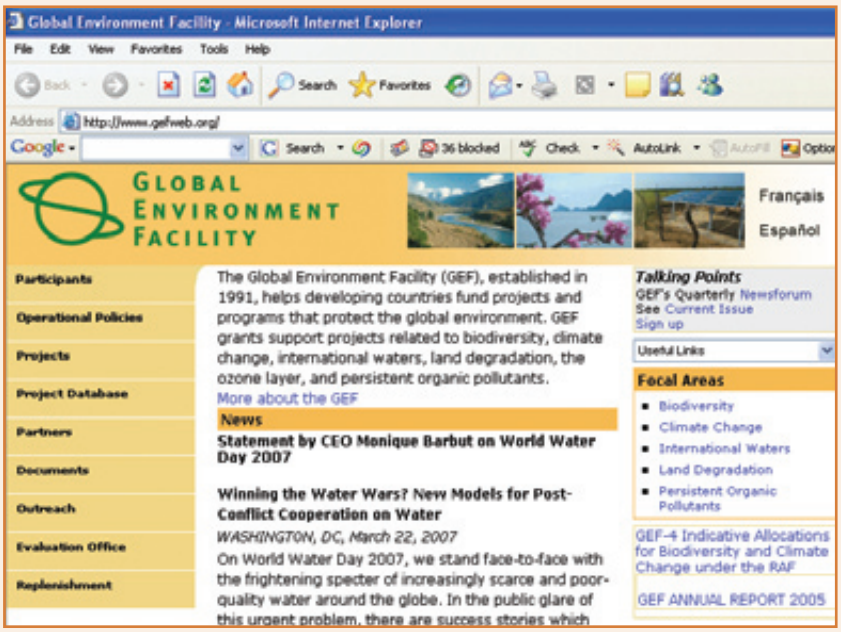
Man-made islands here and elsewhere will disappear with Bahrain potentially losing up to 15 kilometers of coastline if sea levels rise. Underground water salinity will increase and more land degradation will occur in the region, as well as biodiversity on land and in the sea in the Gulf will be affected. The social impact will be severe as many workers will lose their jobs in agriculture, fishing, and some traditional oil industries as a result of a world shift toward renewable energy sources.

In fact, the ecological changes in the Gulf region are small compared to other catastrophic disasters like hurricanes and floods in other parts of the world. But, the economic impacts in the Gulf region will be more severe as the countries in the region mainly depend on revenues from oil and gas exports. If the world shifts soon to other renewable sources, the Gulf region will suffer seriously.

In short, it is very crucial for the Gulf region to start taking necessary steps and actions toward mitigating CC impacts, benefit from incentives available under the Kyoto Protocol like Clean Development Mechanism (CDM) which allow non-annex countries like GCC countries to execute joint clean projects with less GHG emission in the Gulf region like solar power stations, electrified railways, and afforestation projects.

To mitigate climate change, most of the industrialized countries (the so called “Annex I countries”) under the Kyoto Protocol of December 1997 are committed to a quantified reduction of their GHG emissions. To comply with their Kyoto targets, these countries may reduce emissions either domestically or in other countries because the greenhouse effect is of a global nature. Costs to reduce GHG emissions are often lower in developing (Non-Annex I) countries, including GCC countries, because the mitigation measures per ton of carbon dioxide reduced may vary substantially from country-to-country.






**www.gefweb.org**
**The Global Environment Facility**

The Global Environment Facility (GEF), established in 1991, helps developing countries fund projects and programs that protect the global environment. GEF is an independent financial organization that grants support projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants. Information on participants, operational policies, projects, project databases, partners, documents, outreach, evaluation office, and replenishment is available on the GEF webpage. This site offers a mountain of information about the GEF organization, the types of projects it supports, GEF funding, management of GEF projects, the GEF project, and organizational structure.

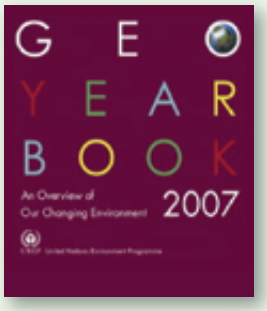
**www.footprintnetwork.org**
**The Global Footprint Network: Advancing the Science of Sustainability**

The Global Footprint Network is committed to fostering a world where all people have the opportunity to live satisfying lives within the means of Earth's ecological capacity. The network is dedicated to advancing the scientific rigor and practical application of the Ecological Footprint, a tool that quantifies human demand on nature, and nature's capacity to meet these demands. Research and development, outreach and community building, education, training, application support, and standards are only a few of the activities that the Global Footprint Network engages in through its website. It provides information on ecological footprinting, footprint standards, tools and services, and partnership resources. In addition, under the resources section, a variety of features such as the newsroom, upcoming events, newsletter, publications, etc. is available free of charge.

## GEO (Global Environment Outlook) Year Book 2007

*By: UNEP*

UNEP, 2006




The *GEO Year Book 2007* is essential, informative, and authoritative reading for anyone with a role or an interest in our changing environment. The 2007 edition covers fisheries to forestry and climate to freshwater management underlining risks and opportunities of globalization. The 2007 Year Book includes global and regional overviews of significant developments over the past year. It highlights linkages among ecosystem health, human well-being, and economic development; examines new thinking on the value of ecosystem services and the threat from ecosystem degradation; and describes recent research findings and policy decisions that affect our awareness and response to global change.

## Human Impacts on Weather and Climate

*By William R. Cotton, Roger A. Pielke*

Cambridge University Press, 2007


This new edition of *Human Impacts on Weather and Climate* examines the scientific and political debates surrounding anthropogenic impacts on the Earth's climate and presents the most recent theories, data and modeling studies. The book discusses the concepts behind deliberate human attempts to modify the weather through cloud seeding, as well as inadvertent modification of weather and climate on the regional scale. The natural variability of weather and climate greatly complicates our ability to determine a clear cause-and-effect relationship to human activity. The authors describe the basic theories and critique them in simple and accessible terms. This fully revised edition will be a valuable resource for undergraduate and graduate courses in atmospheric and environmental science, and will also appeal to policy makers and general readers interested in how humans are affecting the global climate.

## The World's Water 2006-2007: The Biennial Report on Freshwater Resources

*By Peter H. Gleick, Heather Cooley, David Katz, Emily Lee*

Island Press, 2006


Produced biennially, *The World's Water* provides a timely examination of the key issues surrounding freshwater resources and their use. Each new volume identifies and explains the most significant current trends worldwide, and offers the best data available on a variety of water-related topics. The 2006-2007 volume features overview chapters on: * water and terrorism * business risks of water * water and ecosystems * floods and droughts * desalination * environmental justice and water This new volume contains an updated chronology of global conflicts associated with water, as well as an assessment of recent water conferences, including 4th World Water Forum. It also offers a brief review of issues surrounding the use of bottled water and the possible existence of water on Mars. From perhaps the world's leading authority on water issues, *The World's Water* is the most comprehensive and up-to-date source of information and analysis on freshwater resources.

## Green Gulf Report

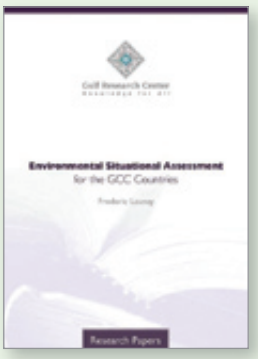
The Gulf region has witnessed rapid socio-economic transformation in the last few decades. These changes have resulted in unprecedented pressures on the natural resources and rich terrestrial and marine biodiversity of the region, compounding the stress caused by naturally arid conditions. However, the governments of the Gulf countries have become increasingly conscious of the damage to the natural resources and the remedial measures required to arrest and reverse any adverse trends. This report aims to document the state of the environment and natural resources in the Gulf Cooperation Council countries, namely, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates. It covers issues related to land resources and terrestrial biodiversity, coastal environment and marine biodiversity, water resources, air quality and solid waste management and seeks to answer the following questions:


- What are the trends in the state of the environment and natural resources?
- What are the major natural, social and economic drivers of these trends?
- What major initiatives have been taken to address these issues and how can these be strengthened further?

## Youth and Environment Research


To bring about change in any sphere, it is necessary to influence the thinking and action of every section of society. It is, therefore, extremely essential that the youth of today understand, assimilate and demand answers to crucial environmental issues which affect their present, and will drastically impact their future as well. This book contains 10 student papers which were chosen by an international panel of experts based on the abstracts received from university students in the UAE and presented at the Youth Conference on Environment, "Green Gulf: Threats, Challenges and Solutions," organized by the Gulf Research Center, Dubai and TERI (The Energy and Resources Institute), New Delhi in association with American University of Sharjah.

## Environmental Situational Assessment for the GCC Countries




*By Frederic Launay*
GRC, 2006

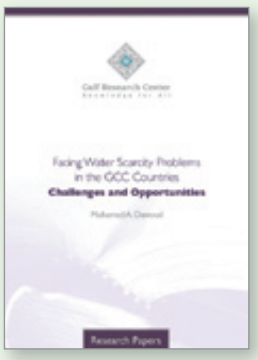
This research paper identifies the major environmental features of the GCC countries, as well as Yemen, in terms of habitats, species, and environmental quality. It also assesses the environmental status and the major environmental challenges facing the region. The Environmental Features component was drawn from the World Wildlife Fund's description of the terrestrial eco-regions of the geographical area examined for this study. Although primarily a political and economic organization, the GCC is important for environmental matters as well. The region is at the centre of many key geo-political issues of our time, from world energy strategy to societal changes. This

socio-economic background did shape, and is still shaping, the region and has obvious consequences on the environment. The analysis revealed that the countries of the GCC and Yemen are facing numerous environmental challenges and have many conflicting priorities, from economic diversification, water supply and food security to environmental protection and conservation. However, the research finds that environmental issues and requirements are still not amply integrated in the long-term development planning of the region, nor are they addressed at the policies level.

## Facing Water Scarcity Problems in the GCC Countries: Challenges and Opportunities

*By Mohamed A. Dawoud*
GRC, 2007

The scarcity of water resources and increasing gaps between demand and available supply in the Gulf Cooperation Council (GCC) countries is a major challenge facing the development sectors. GCC countries have extremely dry climates with scant rainfall, high evaporation rates and limited non-renewable groundwater resources. At present all GCC countries except Oman fall in the critical water scarcity category which is about 500m3 of renewable water/cap/year. In addition, government policies with regard to increasing the level of food self-sufficiency through subsidies and other incentives have contributed to a major expansion in and unrestricted use of non-renewable groundwater resources. This coupled with a lack of defined policies and strategies geared toward optimizing and managing scarce water supplies within the GCC region has contributed to wasteful and uneconomic practices, as well as to the inefficient mining of non-renewable supplies. All GCC countries have made substantial progress in their respective campaigns for water resources management over the last decade, especially in the area of non-conventional water resources. Increased cooperation is urgently required to satisfactorily implement the numerous action plans that have been envisaged as part of the water resources management policies of these countries.




## The Consequences of Climate Change on the GCC Countries and Mitigation Policies

*By Asma Ali Abahussain*
GRC, 2007 (Language: Arabic)

Climate change and its potential impact has been considered one of the most important environmental issues for more than half a century. Most studies show that anthropogenic activities such as consumption of fossil fuels and land use changes are mainly responsible for the GHG emissions that have contributed to the enhanced greenhouse effect known as “global warming.” Although the contribution of GCC countries to global climate change is less than one percent, their environmentally sensitive, fragile ecosystems as well as biodiversity and habitats will definitely be affected by this phenomenon. Climate change could cause inundation of low-lying coastal areas and leave the countries’ vulnerable to drought, dust storms and flash floods. The study illustrates the causes and consequences of climate change on GCC countries. The DPSIR model (Driving Force Pressure State Impacts) is applied to assess environmental impacts of climate change in an integrated way. The study also suggests a plan for a public awareness campaign on climate change with the aim of encouraging participation of all communities in the GCC in efforts to assess and mitigate its impact.

# United Arab Emirates

Located between Saudi Arabia and Oman on the Arabian Gulf, the UAE is a federation comprising seven emirates, or states, formed in 1971 by the then Trucial States after independence from Britain, with a total population of approximately 4.3 million. Although each emirate – Abu Dhabi, Dubai, Ajman, Fujairah, Ras al Khaimah, Sharjah and Umm al Quwain – maintains a large degree of independence, the UAE is governed by a Supreme Council of Rulers, who appoint the prime minister and the cabinet.

**Facts**

| | |
|---|---|
| Name: | United Arab Emirates |
| Capital: | Abu Dhabi |
| Commercial Center: | Dubai |
| Population: | 4.3 million |
| Area: | 82,880 sq km. |
| Length of coastline: | 1,318 km |
| Climate: | Dry-subtropical with hot summers, and high humidity near the coast |
| Arable Land: | 0.6 percent |

The landscape of the Emirates is very dry, with little rain, vegetation and animal life. Mountains only take up some few percent of the total territory. The UAE's combination of desert and coast creates extremely hot and humid conditions in summer, with temperatures of up to 46°C and 100 percent humidity. Although the country is subject to occasional dust storms, it is not threatened by major natural disasters such as floods, hurricanes or earthquakes. The country's land area includes a flat, coastal plain merging into rolling sand dunes of the desert with mountains in the east.

## Environmental Resources

**Water Resources:** The total annual surface runoff produced from rain is about 150 million $m^3$, but there are no perennial streams. The average annual groundwater recharge is about 120 million $m^3$, most of which comes from infiltration from the river beds. The total groundwater abstraction during the year 1995 was estimated at 1615 million $m^3$. This means that groundwater depletion probably amounts to almost 1500 million $m^3$/year. However, this figure does not consider the possible annual recharge of groundwater entering from neighboring countries. In any case, the over-extraction of groundwater resources has led to a lowering of the water table by more than one meter on average during the last two decades, while sea water intrusion is increasing in the coastal areas.

**Natural Resources:** Crude oil, natural gas

## Environmental Challenges

Maintaining groundwater reserves and adequate supplies of fresh water; an unprecedented rate of development; transient population; a high ecological footprint (per capita measurement of environmental impact); high levels of per capita energy consumption; desertification; over fishing of marine stocks; wildlife preservation; shortage of freshwater resources; damage to coastal areas resulting from degrading, oil spills, and other discharges from refineries and oil distribution are some of the environmental challenges facing the UAE.

Another ongoing environmental concern is urban and coastal development. Four large offshore projects are under construction in Dubai and include the creation of man-made islands. The Palm Island Jumeirah, a billion dollar artificial island, is reported to have reduced visibility, affected underwater fauna and altered water flows in its vicinity, leading to increased beach erosion on the mainland. While the Federal Environment Agency (FEA) has assured the United States that environmental impact assessments have been performed and certified for these development projects, concerns about their long-term environmental impacts remain.

## Environment Agreements

The UAE is party to: Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Hazardous Wastes, Law of the Sea, Ozone Layer Protection.

## Environmental Authorities

- Ministry of Water and Environment
- Federal Environment Agency (FEA)
- Environment Agency-Abu Dhabi (EAD)
- Environment and Protected Areas Authority-Sharjah

## Regional Agencies

- Regional Organization for Protection of Marine Environment (ROPME)
- The Red Sea and Gulf of Aden Environment Program (PERSGA)

## Non-Governmental Organization (NGO)

- Emirates Environmental Group (EEG)
- Emirates Heritage Club
- Environment Center for the Arab Towns (ECAT)

Protection of the environment is an important policy objective in the UAE. Former UAE president Shaikh Zayed, who passed away in November 2004, demonstrated a personal commitment to the environment by protecting forestry and preserving wildlife. Continued, high-level attention to the environment has been maintained by Shaikh Zayed's successor, his son Shaikh Khalifa bin Zayed Al-Nahyan.

The Ministry of Water & Environment and the Federal Environmental Agency (FEA) have the responsibility for drafting environmental laws and regulations and serve as the point of contact for international environmental conventions. A comprehensive Federal Environmental Law in 1999 stipulated that all new construction projects implemented in the UAE must complete environmental impact assessments, and these assessments must be reviewed and certified by emirate-level enforcement authorities. In addition to the FEA, other federal ministries have environmental responsibilities in specific areas. The Ministry promulgates laws relating to agriculture, pesticides and marine resources. The Ministry for Presidential Affairs oversees forestry and agriculture programs and funds groundwater research.

Each of the emirates is responsible for enforcing environmental laws through its own local environmental regulatory authority. The emirate of Abu Dhabi established the Environmental Agency (EAD), which is the largest and most proactive of the local authorities in the UAE. Abu Dhabi designated EAD as the "competent authority" for environmental and wildlife issues in the Emirate of Abu Dhabi in November 2000, and it serves as the primary scientific and environmental research institution in the UAE, as well as the scientific authority for UAE for the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).

In addition, UAE has invested significant resources in maintaining healthy populations of falcons, gazelle and oryx. UAE's commitment to protection of wildlife also is reflected in its participation in regional environmental cooperative ventures among Gulf Cooperation Council (GCC) countries to protect Arabian Gulf fisheries, water resource development and cross-border wildlife preservation.

The UAE, since its establishment, has not spared efforts to conserve its environment, develop natural resources on sustainable basis, and combat desertification. The UAE considered this as one of its development pillars and thus was able to accomplish much in the various fields related to environment and combating desertification. In a relatively short time, these achievements would not have been possible without the wise policies of and the urgency that Shaikh Zayed placed on dealing with environmental issues.

**Photo: Mohamed Raouf**

# World Water Day – March 22

"Due to its fundamental role in society's life, water has a strong cultural dimension. Without understanding and considering the cultural aspects of our water problems, no sustainable solution can be found" *(Session on Water and Cultural Diversity, Statement to the Ministerial Conference, 3rd World Water Forum, March 22, 2003).*

## About World Water Day (WWD)

World Water Day was initiated at the 1992 United Nations Conference on Environment and Development (UNCED), in Rio de Janeiro. The United Nations General Assembly designated March 22 of each year as the World Day for Water by adopting an international oath. Upon agreement on observing this day starting from 1993, states were invited to devote the Day to implement the UN recommendations and set up activities suitable for the national context. In addition to the UN member states, a number of NGOs promoting clean water and sustainable aquatic habitats have used World Day for Water as a time to focus on the critical water issues of the world.

## What Happens on World Water Day?

On World Water Day, the United Nations invites international leaders, children and the elderly to participate in a colorful and active ceremony at the UN Headquarters. Participants present their individual ways of appreciating water through prayers, songs, dances and poetry, illustrating that water unifies people and beliefs from all over the world.

This diverse yet mutual understanding and appreciation of water highlights the importance of global cooperation on water-related issues.

## This Year's Theme

'Coping with Water Scarcity' is the theme for World Water Day 2007, which is celebrated each year on March 22. FAO is the coordinating agency within the UN system for the theme. The theme highlights the significance of cooperation and an integrated approach to water resource management of water at both international and local levels.

Equity and rights, cultural and ethical issues have to be addressed when dealing with limited water resources. Imbalances between availability and demand, the degradation of groundwater and surface water quality, intersectoral competition, interregional and international disputes, all center around the question of how to cope with scarce water resources. The theme was decided among all members of UN at the World Water Week in Stockholm in August 2006.

| Previous WWD Themes | |
|---|---|
| **WWD 2006** | Water and Culture |
| **WWD 2005** | Water for Life |
| **WWD 2004** | Water and Disasters |
| **WWD 2003** | Water for the Future |
| **WWD 2002** | Water for Development |
| **WWD 2001** | Water and Health |
| **WWD 2000** | Water for the 21st Century |
| **WWD 1999** | Everyone Lives Downstream |
| **WWD 1998** | Groundwater - the Invisible Resource |
| **WWD 1997** | The World's Water: Is There Enough? |
| **WWD 1996** | Water for Thirsty Cities |
| **WWD 1995** | Women and Water |

# Earth Day – April 22

## How Did it All Begin?

The first declaration of Earth Day was organized by Gaylord Nelson, a senator from Wisconsin who noticed that serious concern about environmental degradation were obvious everywhere except the halls of power. With the help of John Gardner and Denis Hayes, Nelson helped organize a nationwide grassroots celebration on April 22, 1970. The first Earth Day drew instant attention from a wide range of citizens across the United States, and eventually included more than 20 million people.

> "On April 22, 1970, Earth Day was held, one of the most remarkable happenings in the history of democracy ..."
> American Heritage Magazine, October 1993

This day of nature's equipoise was later approved at the United Nations to be observed each year on April 22, to deepen respect, awareness, and care for our planet Earth.

## What Happens on Earth Day?

Earth Day, the largest non-religious holiday in the world, is a time to celebrate gains we have made on our planet and create new ideas to accelerate environmental progress. Earth Day is a time to unite globally around new actions. Earth Day and every day is a time to act to protect our planet.

In cities, towns, and communities around the world, a host of activities are organized for Earth Day. On this day, people are encouraged to participate in Earth Day events and projects, come up with Earth Day ideas, and find out more about Earth Day history.

Earth Day is also a great day to enjoy outdoor activities such as hiking, biking, paddling, walking or climbing, and to celebrate the natural heritage of the Earth. However, Earth Day is not just about observing the beauty and vitality of nature; it is also about renewing your commitment to saving our living planet.

## Earth Day 2007

Earth Day 2007 theme is a call for action on Climate Change. Earth Day Network demands a greenhouse gas emissions cap at 1990 levels by 2020, and then 80 percent below 1990 levels by 2050.

"Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased noticeably as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice cores spanning many thousands of years. The global increases in carbon dioxide concentration are due primarily to fossil fuel use and land-use change, while those of methane and nitrous oxide are primarily due to agriculture." Intergovernmental Panel on Climate Change (IPCC) Report, Working Group I, Paris, February 2007.

THE AUTHENTIC™ EARTH FLAG

## February 19, 2007

The Environmental Center for Arab Towns (ECAT) will cooperate and collaborate with the Gulf Research Center on environmental issues, especially awareness, training and waste management. The ECAT is a scientific research institute dealing with issues concerning natural resources and sustainable development of Arab cities, and specializes in offering consultation and research services in different environmental fields to all Arab Town Organization members. The center's headquarters is in Dubai.

## January 30, 2007

A delegation of businesspeople representing the German Federal Ministry of Economics and Technology visited GRC. Organized by the German Near and Middle East Business Association (NUMOV), the delegation comprised senior executives of German companies specializing in environmental technologies like waste disposal and water treatment. They were briefed about the economic and environmental issues in the Gulf, especially land and desertification issues, biodiversity, water and air pollution, solid waste management, as well as Environmental Management Systems and ISO 14000 series certification in the Gulf region.

## November 23, 2006

A group of 35 women students and faculty members David Kelly and Evelyn Seika from Zayed University in Dubai were briefed about the activities and programs at the center (see photo above). They were also briefed on the economic, security and environment scenarios in the region.

## November 14-15, 2006

Presented a paper at a symposium – "Challenges and Threats to the Environment - Lessons from the Past to Shape the Future" – organized by the Environmental Center for Arab Towns (ECAT) in Dubai. The presentation titled "Green Gulf Study: Waste in the GCC Countries" analyzed the waste profile of the GCC region and the current waste management, treatment and disposal policies, and explained the GRC's next environment project – Green Gulf 2020.

## October 31- November 1, 2006

GRC participated in the Regional Civil Society Forum organized in Manama by the United Nations Environment Program-Regional Office for West Asia. More than 35 representatives of the West Asian and North African civil societies discussed the region's input for the eighth Global Civil Society Forum.

Based in Dubai, UAE, the Gulf Research Center (GRC) began its activity in 2000 as a privately-funded, non-partisan think tank, education provider and consultancy specializing in the Gulf region. The GRC produces recognized research from a Gulf perspective, redressing the current imbalance in Gulf area studies, where regional opinions and interests are underrepresented.

The GRC believes that the Gulf Cooperation Council has transcended the initial reasons for its establishment, to become a fundamental right of its citizens in the development of the region. The GRC seeks to further this belief by being an institution of distinction and innovative research that advances different aspects of development to ultimately benefit the people of the region.

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