

REPORT ON THE APPLICATIONS OF THE VETIVER SYSTEM IN THE ARABIAN GULF REGION March 6-8, Kuwait City, Kuwait

Paul Truong

TVN Director and East Asia and South Pacific Representative,
Brisbane, Australia

Introduction

Early in 2005, the Kuwait Foundation for the Advancement of Sciences (KFAS), through Roley Noffke of Hydromulch, South Africa, was interested in introducing the Vetiver System (VS) to Kuwait and eventually KFAS invited TVN to organise a workshop entitled “*Application of the Vetiver System in the Arabian Gulf Region*” in Kuwait City.

The Kuwaiti Environment

The Kuwaiti ‘desert’ is in the semi arid zone, not extremely arid and not dominated by sand dunes as in the Sahara. It is extremely hot in the summer but it has some rain in winter. Temperatures often exceed 45⁰C in July and maximum 20⁰C in winter with frequent frosts. Rainfall ranges from 23 to 206mm/year, averaging 111mm/year.

Soils are mostly sand to sandy loam and but extremely low in organic matter and nutrients and are bordered by extensive mudflats created by the floodwaters of the Tigris and Euphrates Rivers, which enter the north end of the Gulf through the Shatt Al-Arab waterway. The soils are normally compacted due to heavy military vehicles.

In its original state the desert has a sparse population of native shrubs, the main feed for camels, goats and sheep. But this cover has been almost all destroyed by the tank manoeuvres during the two gulf wars, resulting in extreme wind erosion and dust storms.



Kuwait City on a clear day and under a moderate sand storm

The Workshop

The main objectives of the workshop were:

- To introduce vetiver grass and the Vetiver System to Kuwaiti scientific and industrial organisations, Universities and environmentalists.
- To use VS for infrastructure and environmental protection purposes in Kuwait
- To introduce VS to the Arabian Gulf states in the next phase.

The invited speakers were:

1. Dick Grimshaw, TVN Chairman, USA
2. John Greenfield, TVN Director, New Zealand
3. Paul Truong, TVN Director and Workshop Coordinator, Australia
4. Roley Noffke, CEO Hydromulch, Johannesburg, South Africa
5. Criss Juliard, TVN Director, Morocco
6. Tran Tan Van, Vietnam Vetiver Network Coordinator, Hanoi, Vietnam.

All of these speakers either have experience or worked in semi-arid zones, desert environment or sand dune stabilisation. Due to urgent commitment in the last minutes, Dr Van could not participate in the workshop and Paul Truong, as a co-author, presented their paper for him.



Dr. Naji Al-Mutairi, Director of KFAS opened the workshop and a large poster showing some applications of the Vetiver System

The following is the workshop agenda and topics presented.

- **Day 1:** Field day to the Bagan Oil Field
- **Day 2:** Presentations.
 - **Dr Mamood Abdulrahim:** A Kuwaiti Perspective
 - **Dick Grimshaw:** Introduction to Vetiver Grass Technology
 - **Dick Grimshaw:** Global & Regional Applications of Vetiver Grass System
 - **Roley Noffke:** Applications of the Vetiver System in Central, Southern & East Africa
 - **Dr Criss Juliard:** Applications of Vetiver in Western Africa,

- **Day 3: Presentations.**
 - **John Greenfield:** Water Conservation & Desert Rehabilitation
 - **Dr. Tran Tan Van:** Application of Vetiver in Coastal Dune Stabilization
 - **Dr Paul Truong:** VS for environmental and infrastructure protection
 - **Dr Paul Truong:** Application of VS for industrial and urban waste water treatment: The potential use of waste water (urban and industrial) for desert rehabilitation in Kuwait
 - **Dr Paul Truong:** Vetiver Nurseries and Large-Scale Propagation
 - **Dick Grimshaw:** Ecological Impact of Vetiver in Foreign Environments
 - Discussion and Final Recommendations

Full papers and their accompanied Powerpoint presentations can be seen on www.vetiver.org.

The Bagan Oil Field

The Bagan Oil Field, located in this environment, is the second largest oil field in the world; it is the main oil producing area of Kuwait. This oil field was set on fire by the Iraqi in the final stage of their invasion; the burning of 100s of the oil wells in this field had given us a spectacular and horrible memory of this oil field. The oil from these wells rises up naturally so when the well heads were damaged, oil poured out, ran off and flooded the desert around the wells. The runoff oil collected in the depressions forming oil lakes around the field. Now almost 10 years since that happened the damages to the local environment are still clearly visible, oil soaked crusts scattered all over the surface.

The Kuwait Institute of Scientific Research (KISR) plans to rehabilitate this polluted land with native species and interested in using vetiver as a pioneer plant. So far they tried but failed with many native and introduced plants because partly of the oil polluted soil and partly to the moderately saline ground water and subsoil. More specifically KISR wishes to build up the soil organic content and fertility levels, a pre-requisite for any sustainable reintroduction of native plants, either naturally or artificially.



The Bagan Oil Field, compacted surface layer and oil soaked subsoil



Oil soaked subsoil

Potential VS Applications in Kuwait

In addition to the restoration of native plant in the Bagan oil field, the followings are some potential applications of VS in Kuwait.

- ***Treating effluent by Land Irrigation***

When land area is not a constraint, VS is most effective and low cost for sewage effluent and industrial wastewater disposal or treatment. This application is particularly suited for the sand/sandy loam soil and hot and dry conditions of Kuwait.

- ***Treating effluent in storage ponds and wetlands***

VS is the most effective, low costs and environmentally friendly means of treating domestic, urban and industrial effluent, onsite, in storage ponds and/or wetlands such as the Al-Jahra wetlands in western Kuwait, which has been used as sewage disposal lagoons.

- ***Stabilisation of infrastructure with primary treated effluent***

Sewage effluent, landfill leachate, industrial wastewaters are commonly rich in nutrients, particularly N and P. They are therefore a valuable resource under arid environment like Kuwait. Depending on their sources, these wastewaters may need to be first treated to eliminate bacterial contaminations such as *E. coli* and *Coliform* bacteria. Applications will include earthworks and land shaping for real estate development, dredged material and landfill earth works for urban and industrial developments and other constructions around the population centers,

- ***Desert rehabilitation by water harvesting***

When planted in row vetiver plants will form a hedge, a living porous barrier, which slows and spreads run-off water and traps sediment. As water flow is slowed down, its

erosive power is reduced and at the same time the hedges allows more time for water to infiltrate to the soil, and any eroded material is trapped. Therefore an effective hedge will reduce soil erosion, conserve soil moisture and trap sediment on site.

There are five main ways that vetiver can improve the rehabilitation of degraded arid lands, and the reclamation or stopping the spread of desertification:

1. *Spreading and improving infiltration of run-off water*
2. *Diverting and concentrating run-off water*
3. *Trapping sediment in run-off*
4. *Providing shade to young seedlings of natives species*
5. *Protection soil from wind erosion, and seedlings and plants from sand blasting and sand drift.*

- ***Shallow ponding or artificial Wadis***

A **Wadi** is a 'dry riverbed' that only contains water during times of heavy rain. It is an area of 'clay accumulation' where over the period of hundreds of years, the silt and clay fractions have been washed and 'ground' (by the action of animals' hooves) out of the surrounding soil and transported to the 'out-wash plain' leaving the sand behind to form the desert.

In Australia the same principles are applied in a practice called 'shallow ponding' where low retaining earthen structures are built to collect and temporarily pond run-off water. This practice has been used very successfully to revegetate barren lands in arid and fringe desert zones in central Australia.

Vetiver Grass as an Ornamental Plant

Under these extremely harsh conditions, the establishing and maintaining ornamental plants in public areas such as parks and road foot paths and roundabouts are very difficult and expensive and the main cost is from irrigation with fresh water. Therefore the local authority is looking for drought tolerant species, particularly those not affected by moderately saline water, such as recycled water and underground water in Kuwait.

With this in mind KISR introduced a number of vetiver cultivars from southern India to Kuwait City. At the time of the conference, these introductions were growing very well through winter under fresh water irrigation on saline sand. Judging from their height, the roots of these plants must have reached the moderately saline water table which is only 40-50cm from the surface.

In addition to this introduction, a local businessman and a vetiver enthusiast, Mr. Suresh, has also brought in some vetiver from India about 2 years ago and they have been flourishing in his garden since and have reached the height of at least 1.5m in summer. Subsequent to our visit Mr. Suresh went back to India and brought back 24 cultivars from Mr. Haridas of KDHP Tea Co., who has been collecting and used vetiver extensively for erosion control on the hilly tea plantation in Munnar, Kerala State, India. This collection is now been tested for its suitability as ornamentals under the Kuwaiti environment.



Six month old vetiver at KISR Research Station, Kuwait City



About two year old vetiver at Mr Suresh residence, Kuwait City

Impact

This workshop produced a keen interest in the Kuwaiti community in using VS for environmental protection purposes. As a result of these presentations KFAS has formed a Vetiver Working Committee to look at and coordinate different applications of VS from Universities, public and private organizations.

Conclusion and Recommendations

1. Vetiver grass has grown successfully elsewhere in the world under conditions as harsh as those in Kuwait.
2. It should not be difficult to adapt the Vetiver System in Kuwait to applications that include supplementary irrigation, at least initially, or the involvement of waste water.
3. It is probably possible to use vetiver where there is an accessible ground water table (wadis).
4. It may be possible to use vetiver under irrigation with recycled or primarily treated effluent.
5. Where there is no groundwater, supplementary irrigation or other concentrated supply

of water for plant growth, vetiver will unlikely be suitable.

6. Although much is known about vetiver grass, its growth and applications in other parts of the world, some additional testing and research will be required under Kuwaiti conditions.

7. It will be possible to establish a permanent place for vetiver under the Kuwait environment and that investigations into this unique plant in Kuwait and the region as a whole.

8. It is essential that good quality and sterile plant material be imported to Kuwait. It would make sense to bring in a number of ecotypes for comparison and testing.

9. We would strongly recommend that private sector such as landscaping companies be involved from the start of a Vetiver Systems initiative in Kuwait. The reason for this is that the private sector will quickly see where there is potential application; and the profit motive and the desire for expanded business should assure quality applications. Also the private sector landscapers generally have a good “feel” for plants and can often make them grow where others can not.

10. We know that KFAS has a strong interest in health issues. Vetiver is and has been used as a medicinal plant in many parts of the world, but much of it is anecdotal (as claimed by modern herbalists and traditional medicinal practitioners). In addition to research that could be conducted on vetiver's ability to improve the quality of potable water, we suggest research of the root in the treatment of gastro-intestinal problems, diabetes, malaria, Bilharzias, insomnia, rheumatism, menopause and aging skin?