

## PLENARY 2

### PAST ACHIEVEMENTS AND FUTURE DIRECTION OF THE VETIVER NETWORK INTERNATIONAL (TVNI)

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#### History and Achievements

Vetiver hedgerow technology for erosion control is not a new. Vetiver was used for erosion control, bank and channel stabilization for centuries in parts of India. The British colonial agricultural services promoted Vetiver hedgerows for erosion control in the 1930s, particularly on some of the Caribbean islands and Mauritius. In the 1950s the Fiji Sugar Corporation used these hedgerows extensively to protect sugar cane fields on steep slopes - they were still there 30 years later. During this post war period engineered systems, following patterns developed in the USA, gained ascendancy and complimented age-old terrace systems that had been used for centuries in many parts of the world. Unfortunately these systems did not always work, and they became more expensive to construct and maintain. What changed? In the early 1980s John Greenfield from New Zealand, who had worked with the Fiji Sugar Corporation in the 1950s, joined the World Bank team in India where he introduced Vetiver hedgerows quite widely to four or five large watershed development projects. He authored a small handbook for farmers "Vetiver Grass – A Hedge Against Erosion". This served as a basis to extend the technology to other tropical countries (translated and published in at least 20 languages). At the same time some Indian universities undertook research into the effectiveness of Vetiver hedgerows for soil and water conservation. In a nutshell the results showed more than 90% reduction in soil loss and up to 70% reduction in rainwater runoff. In effect Vetiver hedgerows along with contour farming cultivation virtually provided a drought proof cultivation system that was low cost, easy to learn, and one that worked.

In 1989 the US Academy of Science set up a committee, under the chairmanship of Dr. Norman Borlaug, to review the Vetiver Grass Technology (VGT) for soil and water conservation. The outcome of this review was very positive and its findings were published in the book "Vetiver Grass – A Thin Green Line Against Erosion".

The World Bank expanded its support for VGT. It produced (Jim Smyle, now TVNI President, was the editor) a newsletter – The Vetiver Information Network. These newsletters are available on line at: [http://www.vetiver.org/TVN\\_newsletter\\_index.htm](http://www.vetiver.org/TVN_newsletter_index.htm). In 1988 I visited China and introduced the technology there.

Dr. P.K.Yoon of the Rubber Research Institute of Malaysia undertook some seminal research on Vetiver grass and its applications. This practical work "A Look See At

Vetiver Grass in Malaysia is online at:

[http://www.vetiver.org/MAL\\_PK.Yoon%20Look%20see/START.HTM](http://www.vetiver.org/MAL_PK.Yoon%20Look%20see/START.HTM)

At about the same time the King of Thailand became interested in VGT and he set out to test it and verify its uses and benefits on his research farms. Thereafter he pressed his government and the Royal Development Projects Board to start extending the technology in Thailand. Another Thai, Diti Hengchaovanich, a highways engineer working in Malaysia, together with P.K.Yoon commissioned research into the strength of Vetiver roots and its impact on the shear strength of soil. The results were impressive. Vetiver roots had on average a tensile strength equivalent to mild steel - 65 Mpa (psi = 9427 lbs. per square inch) and improved the shear strength of soil by as much as 45%. Currently one of the leading advocates for slope stabilization using VS is Roley Nuffke of Hydromulch, South Africa. A recent [online photo essay](#) "Geotropism of Vetiver" by Paul Truong summarizes the progress of VS for slope stabilization.

Over the next few years' steady gains were made in broadening the technology and applying it. Paul Truong and his colleagues in Australia, China (Xia Hanping) and Thailand, and Vietnam expanded research into Vetiver's tolerance to and uptake of heavy metals. VS applications for: stabilizing landfills and dealing with leachate effluent (Australia, China, Thailand, USA and Mexico); mitigating and stabilizing mining wastes and sites (Australia, China, India, South Africa and Venezuela); processing wastewater from homes and sewage processing plants (Australia, Indonesia, India, Vietnam), were initiated with a good deal of success.

Bi-product use of Vetiver has become of increasing importance and interest, as research and demonstration showed its potential for a forage (Australia, China, India and Vietnam); mulch (China, Ethiopia, India, Vietnam); feedstock as a biofuel (Dominican Republic, Haiti); and a material source for handicrafts (China, India, Thailand, Venezuela). As small farmers started to see the potential use of bi-products their interest grew in the use of Vetiver for erosion control (Ethiopia, China, Haiti, Indonesia, India, Kenya, Malawi, Madagascar, Philippines, Tanzania, Thailand, Zambia, Zimbabwe, South Africa, Venezuela, and others). Most importantly small farmers have shown that they can produce high quality Vetiver plant material for sale for commercial applications of VS.

Over the past 25 years the Vetiver System (the generic name for all the applications) has grown and is used today in most tropical and semi tropical countries as well as niche areas in more arid regions (Mediterranean, California, Kuwait, Iran and Turkey).

In summary by 2013 some 25 years after the World Bank/Greenfield initiative in India VGT has proven to have great potential for a number of important applications involving agriculture, infrastructure, land rehabilitation, pollution control, mining, health and various other uses. It is an environmental technology that has significant cross sector implications with the potential of one application driving another.

**How did we get there?**

After retiring from the World Bank Dick Grimshaw a nonprofit organization (NGO) that would solely focus on VGT. The Vetiver Network, later renamed The Vetiver Network International (TVNI) was registered as a Virginia, USA, company with 501 3 c tax-free status.

Getting information out to the public was our first priority; first through the publication, twice a year, of an extensive newsletter (each 80 pages or more [http://www.vetiver.org/TVN\\_newsletter\\_index.htm](http://www.vetiver.org/TVN_newsletter_index.htm)) that documented ongoing research, feedback from field programs, and general commentary. Soon this was supplemented by a website ([www.vetiver.org](http://www.vetiver.org)); eventually the newsletters were phased out and the website became the main source of VGT info for the public. In 2006 Paul Truong, Elise Pinner and Tran Tan Van authored a new Vetiver manual – “Vetiver System Applications – Technical Reference Manual”, covering all aspects of VS, and translated now in nine languages and downloadable from our website at no cost. In more recent years we have established a blog <http://vetivernetinternational.blogspot.com/> and a Facebook page <https://www.facebook.com/groups/vetivergroup/>. Vetiver Grass Facebook page has become an important place where VS users can exchange experiences and ideas. With the advent of the social networks we have encouraged country networks, individuals and entrepreneurs to create their own dedicated Vetiver Facebook pages and blogs. These are listed at: <http://www.vetiver.org/g/other.htm>. Most of this effort has cost nothing or very little, thanks to Google and Facebook. Our manuals can be bought from Amazon.com, but all are available and downloadable electronically, at no cost, via our website.

Following establishing information transfer processes, TVNI encouraged multilateral development agencies, governments, NGOs, and the private sector to start using the technology. NGOs quickly saw the advantage of VS for soil and water conservation for small farmers as the technology does not depend on complex and costly technical support, and NGOs found it easy to introduce the technology (fortunately Vetiver grass, *Chrysopogon zizanioides*, was introduced to most tropical countries in colonial days for the oil of Vetiver, extracted from its roots, and thus the plant was available in most countries).

In parallel to developing actual applications in the field it was important to encourage research at national level. This was achieved: through the efforts of individuals who saw the benefit of VS and were in a position to encourage local universities and institutions to take up Vetiver research; by including Vetiver research in development project funding; by TVNI research grants; the establishment of TVNI Awards program that awarded cash prizes of up to US\$5000 (totaling USA\$40,000) every four or five years for various categories of research - the latter was a useful carrot; and encouraging graduate students to undertake research in Vetiver for their PhD thesis. His Majesty the King of Thailand established “The King of Thailand Award” for outstanding proficiency in Vetiver. Worth \$10,000, the award is made at the time of International Vetiver Conferences that are nearly always attended by TVNI Patron - Her Royal Highness Princess Maha Chakri Sirindhorn of Thailand representing the King.

The main centers of research have been in India (agricultural universities), China (primarily the South China Institute of Botany), Australia (University of Southern Queensland), Vietnam (Cantho University), Thailand (universities and government research centers), Malaysia (Rubber Research Institute), and other research centers in Kenya, Kuwait, Ethiopia, Nigeria, The Netherlands, USA and Venezuela. Additionally there has been a lot of practical experimentation by users that have led to the use of modified applications and techniques. More recently a study and report by USDA/NRCS in Hawaii titled “Sunshine Vetiver – Plant Guide” was very positive and importantly confirmed Vetiver’s non-invasive characteristics. [http://www.vetiver.org/USA-USDA-NRCS\\_Sunshine.pdf](http://www.vetiver.org/USA-USDA-NRCS_Sunshine.pdf) . Most of this research is documented on TVNI’s website.

TVNI has used the venue of Vetiver specific workshops and conferences to bring to the front and to the public the results and impact of the activities mentioned in the preceding paragraphs. The Vetiver community has been fortunate to have the deep commitment of His Majesty the King of Thailand, his family, and his foundation, The Chaipattana Foundation that has supported all the International Vetiver Conferences (ICV) that have been held every four or five years. The first two were held in Thailand (1966 and 2000), the third in China (2003), the fourth in Venezuela (2006), and the last in India (2011), The next conference will be in Vietnam in 2015. The proceedings for these conferences (and workshops) are at: <http://www.vetiver.org/g/conferences.htm>.

TVNI manages a certification program that certifies an individual’s technical capability in specific aspects of VS. The certified people are listed on our website. This certification process is a start towards professional recognition.

## **Lessons Learned**

Some interesting facts and lessons have emerged from our various initiatives, these include amongst others:

- Published VGT characteristics and applications are scientifically well supported and verified.
- The main VS applications relate to soil and water conservation (including groundwater recharge), contaminated land and water remediation (including pollution control), and slope stabilization associated with infrastructure and natural systems such as riverbanks and gullies.
- There are many interesting bi-products of Vetiver that are being used, tested and developed.
- Small farmers have been slow to use VS for erosion control for many reasons; their reluctance could be reduced through better training at community level and a better appreciation of the many applications and uses of Vetiver.
- The adequate availability of Vetiver plant material is a prerequisite to any VS program however big or small.
- VS should not be a technology confined only to agricultural and soil conservation staff and engineers.

- When VS is applied for infrastructure – slope stabilization or waste and water remediation - it is important that technically verifiable specifications are clearly established.
- The private sector has a major role to play in extending the technology and pressing government policy makers and agencies to use it.
- The demand for plant material will increase substantially and it needs to be propagated near the application site. Small farmers can be easily taught to produce high quality Vetiver plant material.
- Workshops and conferences are important for furthering the technology, and should be continued.
- Greater efforts need to be made to create VS awareness at policy maker levels across various sectors.
- The Internet has been and will be critical to the success of VS in providing information fully in the public domain on the technology and for providing the means for social networking and interaction.
- The 100% volunteer culture of TVNI and its associates has helped assure a common trust amongst users that has resulted in an unprecedented sharing of information and experience that to my knowledge has not been duplicated.

### **What Next for the Vetiver System**

At this time of: climate change and the associated extreme weather conditions; a world population expansion that can hardly feed itself and is using its land and water resources at an unprecedented rate; deteriorating quality of natural resources both in land and water; ever increasing costs of stabilizing and maintaining infrastructure; and continuing rural poverty and food insecurity, VS offers a well tested solution that can be applied over a wide range of conditions to mitigate some of these problems.

In discussions with public, institutional, private sector entities, and communities we should highlight and pursue the following:

#### **Agriculture:**

- VS should be a key on-farm component (specially in the small farm environment) in addressing food security. High yielding seeds and fertilizer are not enough, soil erosion and moisture conservation must be addressed, if the full benefits of genetic and cultural improvements are to be achieved.
- The world's net increase in irrigable land will in the future be zero or negative, and therefore any major increases in food production will have to come from rainfed farming. VS conserves improves soil moisture and recharges groundwater.
- Small farmers can benefit by using the many bi-products of VS, and could greatly enhance their incomes if VS were to be widely used for slope stabilization of infrastructure and for pollution control, with farmers and communities providing the plant material.

**Infrastructure:**

- VS has been tested under practically every conceivable condition for slope stabilization (roads, railways, canals, drains, building construction sites, and levees). The applications are well documented. It is generally recognized that VS is significantly less costly and often more effective than other technologies. There is no reason why it should not be applied widely. In addition its use for slope protection would impact significantly on rural communities if the latter were contracted to supply the plant material, and of course though some communities would be paid to plant it. VS should be included in all designs where it could be appropriately be used.

**Contaminated land and water:**

- VS should be considered in design of industrial and urban scale wastewater treatment plants, landfills, and mine reclamation.
- VS is appropriate for treating black and grey water effluent from individual and communal units. In doing so smell and disease would be reduced.

**Land Rehabilitation:**

- VS should be used for rehabilitating degraded lands, stabilizing gullies, and prevention of further degradation.

**Vetiver bi-products:**

- If used on large scale for the above applications there would be significant bi-products that could be utilized for: fuel, mulch, thatch, building materials (fiber board), paper, handicraft material source, and many other activities. All provides additional income or savings in buying alternatives. In addition large-scale use of VS will reduce destruction of forests and will increase the sequestering of atmospheric carbon.

**What Next for The Vetiver Network International**

The Vetiver System has become “main streamed” and is sufficiently well known to survive and expand, albeit slowly even without a formal organization such as TVNI at the center. TVNI has deliberately over the years put effort into getting others to take the VS lead in their communities; TVNI has no paid staff, no field offices or representatives (except for users in the field), and no rules of operation. In other words with minimal TVNI input global networks and users make the decisions – even if we wished differently, we could not do otherwise!

Thank you

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