The Vetiver Network

Visit by Dick Grimshaw to China

April 1 to 20 -- 2002

I visited South China during April 2002 to see some of the progress relating to Vetiver Systems (VS) . I was impressed by the overall progress in the application and dissemination of the technology. There is a wide range of applications of VS being undertaken by a number of different agencies, corporations and private sector businesses. Further research scientists and government institutions are working quite well with implementing agencies and with the private sector. The long term success of VS in China will be dependent on this relationship and is a good example to other countries who wish to develop and disseminate technologies like VS.

Award to China Vetiver Network

Recently the Institute of Soil Science and the China Vetiver Network was awarded the premier environmental award by the US based International Erosion Control Association (IECA) for its work with VS. Prof. Liyu Xu - China Vetiver Network (CVN) Coordinator is to be congratulated for this award - success with VS in China has been very much due to his hard work and strategic approach to VS development.

Chinese Public Education Program Honored for Excellence in Erosion and Sediment Control -- Press Release -- ***Steamboat Springs, Colorado, USA*** – A network of Chinese farmers, engineers, scientists and educators has been honored for excellence in natural resource conservation and environmental protection for promoting and adopting the use of new technologies using living plants and trees to control erosion on fields and at construction projects in China.

This accomplishment has earned the China Vetiver Network/Institute of Soil Science the 2002 Environmental Achievement Award of Distinction from the International Erosion Control Association.

The annual award is given to an outstanding project which demonstrates excellence in natural resource conservation and environmental protection through the use of effective erosion and sediment control policies, practices and/or public education.

The award was presented during formal ceremonies at the annual IECA conference in Orlando, Fla., March 1, 2002. Based in Nanjing, the China Vetiver Network was established at the Institute of Soil Science in 1996. It is based on a similar network which began in 1992 to promote the use of agroforesty practices. That program ended successfully in 2000.

The China Vetiver Network continues today to educate farmers about the value of using vetiver grass to protect farm land, especially tree and orchard crops, from erosion. A thin barrier of vetiver grass can reduce runoff of stormwater as much as 70 percent and reduce soil losses by as much as 90 percent. Compared to using hard materials, like rock or concrete to control erosion, vetiver grass costs 90 percent less and can produce a green slopes in just 100 days in southern China. Because of such benefits, the vetiver education program was soon expanded to include use of the grass to control erosion on construction projects, like highways, railways, dams, quarries and mines.

The vetiver education program has concentrated on the Yangtze River Basin and other areas of southern China, such as Fujian, Guangdong, Zhejiang, and Jiangxi (not Jiangzi) Provinces. Scientists and technicians with the China Vetiver Network used a wide variety of ways to explain the role and advantages of using vetiver grass to control erosion. Their efforts ranged from newspapers, television and journal articles to conferences, training

courses and demonstration projects. They even used New Year Cards to promote vetiver grass technology.

This educational program has produced some dramatic results. For example, by combining agro-forestry practices, like growing wheat in-between rows of chestnut trees, with vetiver grass barriers, farmers in the Dabie Mountain have increased the annual value of production from only 102 Yuan ($12.75 US) per hectare to more than 80,000 Yuan ($10,000 US) per hectare

Vetiver grass is now being used in several provinces to protect highway embankments from erosion. Fujian Province is promoting the use of vetiver grass on city and county road projects and the Zhejiang Highway Association has established its own Vetiver Engineering Company. The new Xin-Change Railway Company in Jiangsu Province has set up a demonstration vetiver project and started the Railway Vetiver Engineering Company. Many private vetiver companies have been established in Guangdong (not Guangzhou) Province. Meanwhile, in addition to growing vetiver to protect their fields, farmers are also growing the grass for sale and use on construction projects.

The IECA, founded in 1972, is a non-profit professional organization with members in 52 countries around the world who are dedicated to minimizing accelerated soil erosion

This is the eleventh year of the annual IECA Environmental Excellence Awards program.

Anhui Province

CVN was awarded and negotiated a grant from the Salvation Army (Hong Kong) and Australian Aid to establish a pilot soil and water conservation project in the poverty stricken area of the Dabie Mountains of Anhui Province. The project is using VS to stabilize terraces and is promoting better agricultural practices including the establishment of chestnut trees. This will result in very significant income increases to the very small and poor farmers in the area. At the time of my visit I learned that the Japanese may provide grants to extend the pilot project.

The Dabie Mountain Project will be the first project that will seriously use VS for soil and water conservation since its pilot application (1988 - 1991) in the World Bank financed Red Soils Project located in Jiangxi and Fujian Provinces. In the intervening years, despite clear evidence from demonstrations and research in south

Dabie Mountains: Traditional methods of stabilizing terraces with crop residues -- not very effective.

Dabie Mountains: Terraces with newly planted vetiver hedgerows.

China, there has been no interest in VS for soil conservation for two reasons: (a) farmers did not see any immediate direct returns from vetiver, and (b) the methods of teaching and marketing the technology to farmers was inadequate. We hope that CVN's participation in this new venture will be the start of a new effort to use VS for soil and water conservation in China.

The Regional Head of The Salvation Army looking at newly planted vetiver grass to protect the edge of a village road in the Dabie Mountain Project.

Liyu Xu is hoping to organize a training course to teach Dabie Mountain women how to use vetiver grass for making handicrafts. The instructors will come from Thailand.

Zhejiang Province

Liyu and I spent a couple of days travelling with Mr. Zhao Zhaoqang, Director of the Zhejiang Vetiver Network and the Hanzhou Zhejiang Vetiver Engineering Company Ltd. in the south west part of the province in the mountainous prefecture centered on Lishui. This area is the home of the Se minority group and was until recently very isolated. Now with major highways being constructed the area is much more accessible. The area produces very high quality tea.

Mr.. Zhao Zhaoqang has been working closely with the Zheijang highways officials for some years now (since the 1997 Nanchang vetiver conference for engineers) and has involved the engineers and government leaders in all phases of VS introduction. He has received advice and support from the China vetiver Network. Following three years of demonstrations a detailed review was undertaken of the effectiveness of vetiver for highway stabilization, and as a result of the positive outcome of the review the Zheijang provincial officials approved VS for highway stabilization.

The company has 4 ha of nursery located near Hanzhou, has produced an excellent promotional brochure and

has planted vetiver on county, provincial, national roads and on superhighways.

A Se farmer wearing his “raincoat” made of carefully woven palm leaves

Vetiver slips dipped in a mud slurry prior to planting at the highway site

Provincial highway stabilized with vetiver. Planted April 2001. Note the combination of “hard” and “soft” measures. The top few rows of vetiver have been recently cut. There was some rilling on the left hand side but the slope has now stabilized. There remains a management problem.

Highway stabilized with vetiver. This is a very large and steep slope with hard measures at the base only. Prior to the planting of vetiver the rock wall at the base of the slope was regularly breached. Note how there has been rilling, but now the slope is stable.

Overall the quality of planting and application was good. Some of the slopes were very steep, over 60%. Complete stabilization was achieved at all the sites visited even without cut off drains on the slopes (rainfall in this area exceeds 1500 mm annually). The planting material on the whole was good, although better selection to exclude dead woody stem material would have been preferable. Prior to planting, slips with about three tillers each were dipped in a slurry of mud that contained compound fertilizer and a rooting growth hormone.

The area we visited was extremely mountainous and vetiver had been planted on fill slopes ranging from 60 - 70 degrees -- steep!! Planting had been undertaken in different seasons. Although planting can be done in September and October the best time is March through June, before the heavy rains of July and August. All planting used bare rooted plants and survival was good in the first few years (although it did appear that some plantings had "weakened -- degenerated after a couple of years -- this may well be due to reduced fertility). The applications were very effective and all sites we saw had been pretty well stabilized. In total the company had planted 279,000 $m^{2.}$. The total saving of using vetiver instead of "hard" engineering measures was approx. Y8.37 million, or about a million US dollars. VS application resulted in a 90% cost saving, and was environmentally friendly as well.

The main concern relates to post application management. There are questions that relate to the longevity of the plantings. On these very infertile soils will further fertilization be required? Should slopes now that they are stable be planted with trees? What should the post application management be?

I was impressed by Mr. Zhao Zhaoqang's approach to VS. He had visited vetiver work in Jiangxi and Fujian Provinces, he thoroughly investigated results, and then carried out tests and demonstrations that involved the stakeholders -- Provincial leaders. Madam Peng, a Highways Department associate of Mr. Zhao Zhaoqang, should also be congratulated for her commitment to, and understanding of the technology.

As a general observation there is a clear need to protect agricultural land in adjacent areas with vetiver. High value crops such as tea would benefit significantly from VS applications. The local Se people would also benefit from using vetiver for handicrafts if they were trained. CVN should follow up on these suggestions.

Jiangxi Province

I spent a day visiting some of the lowland sites adjacent to Poyang Lake where VS was being used to stabilize 22 kilometers of highway embankment, and the Highways Department staff are to be congratulated on a good job. As in Zhejiang Province the quality of planting was generally good. The embankment fill rarely exceeded 5 meter. There had been some problems with late planting of vetiver in December, most of these plantings had died. In Jiangxi winters are colder than Guangdong and Fujian, therefore planting after October seems inappropriate (it appears that if newly planted vetiver gets hit by a bad frost before new roots are properly established the plant will die. Planting from mid march assures good survival. We saw some good examples of sites where vetiver, planted on highway fill slope,had been totally inundated for more than three months due to lake level increases of Poyang Lake. The vetiver showed no signs of stress and had recovered well.

Vetiver plant material in Jiangxi is supplied primarily by the Red Soils Institute, near Nanchang. However a number of private companies are being established. One owned by Yang Xiao Yie and Cheng Hong have about 5 ha of nursery and has the intention to further expand. Australian consultant, Tony O'Brien, currently living in Nanchang (and who accompanied on my visit to Jiangxi vetiver, is currently living in Nanchang and is volunteering to provide technical support to local companies if requested.

As in Zhejiang Province there is plenty of scope to use vetiver for on farm soil and water conservation in Jiangxi Province. This province was where VS was first applied in 1988, it works and has been researched in the province. A greater effort needs to be made to find improved ways of dissemination to farmers. One option might be to bring a number of sectors together for a workshop -- letting agriculturists learn from highways engineers and vice-versa.

Regretfully, I seemed to have mislaid the digital images that I took in Jiangxi - apologies to my friends in that province!

Guangdong Province

I first visited Guangdong Province more than 10 years ago after I gave a presentation about VS at an international rice symposium at the Rice Research Institute at Hanzhou. My presentation was the only one that was unrelated to rice! Fortunately for Guangdong Prof. Junyen Kuo of the South China Institute of Botany attended the symposium and was interested in what I spoke about. He returned to Guangzhou and tested VS on the rehabilitation of a very degraded site known as the "Red Desert". The success of this rehabilitation job was enough to get a young scientist -- Xia Hanping -- involved and so VS moved forward. Since then Hanping got himself a doctorate (vetiver of course!) and has undertaken some 20 research projects with published papers. The story of VS in Guangdong can be found in PRVN technical bulletin No 2001/3 - development of the Vetiver System in Guangdong, China by Xia Hanping. This paper is illustrated and is obtainable from the Office of the Royal Development Projects Board,78 Rajdamnern Nok Avenue, Dusit, Bangkok 10300, Thailand.

There are at least 5 private sector companies promoting VS in Guangdong Province. These companies include:

Guangdong Huihua Environmental Science and Technology Co. Ltd. (President - Ms. Xu Yuanxin)
Guangdong Hongri Landscape Architecture Co Ltd. (President - Mr. Hong Hao)
Guangzhou Vetiver Grass Environmental Sciences Co Ltd. (President -- Mr. Feng Ziyuan)
Guangzhou Rivers Enterprise Co Ltd. (President -- Mr Liu Xiao Feng)
Guangzhou Eco Environment Science and Technology Co. Ltd. (President -- Mr Zhang Ping)

These companies work closely with scientists at the South China Institute of Botany and the South China Agricultural University, as well as with the provincial government and the municipal government of Guangzhou. Private entrepreneurship has been a driving force behind VS. These companies are looking for profit and market VS aggressively. They have or are establishing web sites and have produced some excellent brochures. They would do even better if they were to cooperate more amongst themselves!!

The VS work in Guangdong is interesting because of its gathering momentum and its diversity of application. I was unable to see all the applications but those that I did see on this visit included pollution control at the largest landfill in south China, artificial wetland construction, ornamental uses of vetiver, construction site stabilization, highway stabilization, and quarry reclamation. In addition VS is being used in Guangdong for mine land reclamation, riverbank stabilization, reservoir draw down area stabilization and rehabilitation of degraded lands (some polluted by the products of the petroleum industry).

Overall I am impressed by the quality of work and the commitment to applying the technology correctly. There were very few problems, I visited what must be one of the largest vetiver nurseries in the world -- 50 ha of vetiver stretching to the horizon owned by Guangdong Huihua Environmental Science and Technology Co. Ltd. -- that is commitment!

At one nursery I saw the result of some minor rat damage. It appears that rats will eat the tender base of the vetiver leaf and stems when adjacent crop lands have been harvested. When new crops are planted the rats revert to the crop land.

It was interesting to see the rapid colonization of native plants once vetiver had been established. This was particularly evident at the rehabilitated quarry sites at Shenzhen thus supporting the fact that vetiver grass is one of the best pioneer plants in the rehabilitation process. Another new area was the use of vetiver as an ornamental grass in the landscaping of parks. The plant softens the harshness of concrete walls and blends in well with water and rocks.

The following images and commentary provides a picture of some of the VS developments in Guangdong.

Dr. Xia Hanping standing next to one of 13 vetiver provenances that he is comparing. This particular provenance is the so called “Karnataka” vetiver from south India. He believes that it has good potential and that it “browns” up less in the winter months. The image on the right is a 1987 image of the Karnataka vetiver growing in a farmers field in Karnataka State India. It is softer, more digestible to livestock and more shade tolerant. This may prove to be a very good vetiver type for China particularly if it remains green in the winter months.

The left and right banks of the Guangzhou Datianshan Garbage Landfill stabilized using the Vetiver System. Prior to planting vetiver no plants could grow on the site. Leachate outflows have been significantly reduced following the application of VS. In one or two places there has been some dieback due to escaping methane gasses. It is possible that an artificial vetiver wetland will be developed at the base of the landfill to clean the remaining leachate flows. VS application was carried out by Guangzhou Rivers Enterprise Co. Ltd. and is being monitored by staff of the Zhongshan University. Other landfills are being stabilized with VS at Zhuhai City located in the south east of Guangdong Province.

Newly planted vetiver at the landfill. Note the landfill material that the vetiver is growing in.

This nursery, owned and operated by Guangdong Huihua Environmental Science and Technology Co. Ltd., is 16 ha and has enough plant material to plant 7,500 linear km of vetiver hedgerows. Most nurseries in China are much smaller between 5 to 10 ha. The size of the nursery underscores the need to have large quantities of plant material available so that contracts can be met on time. This is particularly important where the planting season is limited by winter months and at the height of the wet season when new plantings may be washed away by heavy rains.

VS used to protect both sides of the county road at Cong Hua. Note how the vetiver hedge planted on the left side of the road at the toe of the slope has prevented soil and rocks from entering the road side drain, Thus reducing maintenance costs. To protect the face of the cut slope a vine/ivy locally known as Climbing Tiger (*Parthenocissus laetiverens*) was planted behind the vetiver.

Close up of Climbing Tiger (*Parthenocissus heterophylla*. Vetiver hedgerow has captured soil, moisture and nutrients into which the vine was planted. As a result growth is exceptionally good and it is expected that the whole face will be covered within three years. This work was carried out by Guangzhou Rivers Enterprise Co. Ltd. and is an excellent example of the combination of two “soft” technologies

China's population and government, contrary to Western opinion, is very concerned about the environment and is anxious to improve the eco conditions of their habitat. In this case one of Guangzhou's satellite communities created, with the help of South China Agricultural University, artificial wetlands around a small lake. This lake, about 2 ha in size, previously was the collection point for all household waste and runoff from the surrounding the buildings and apartments. It was a garbage dump and stank. The residents wanted a cleaner environment. The solution was to create an artificial wetland around the lake in the form of raised filter beds containing various species including vetiver. Runoff water from the drains was collected in a holding tank and pumped through the filter beds which remove the heavy metals and other pollutants. Relatively clean water then enters the lake. As a result the lake is much cleaner and is surrounded by filtering "flower beds". There is still some green algae in the lake and this might best be removed by using floating "islands" of vetiver as recently demonstrated in Viet Nam. The University is monitoring the results and is comparing the various plants being used as to their ability to remove pollutants.

The capital cost of this project was not cheap -- approx. US $300,000. Monthly operating costs are estimated at about US $ 500 per month.

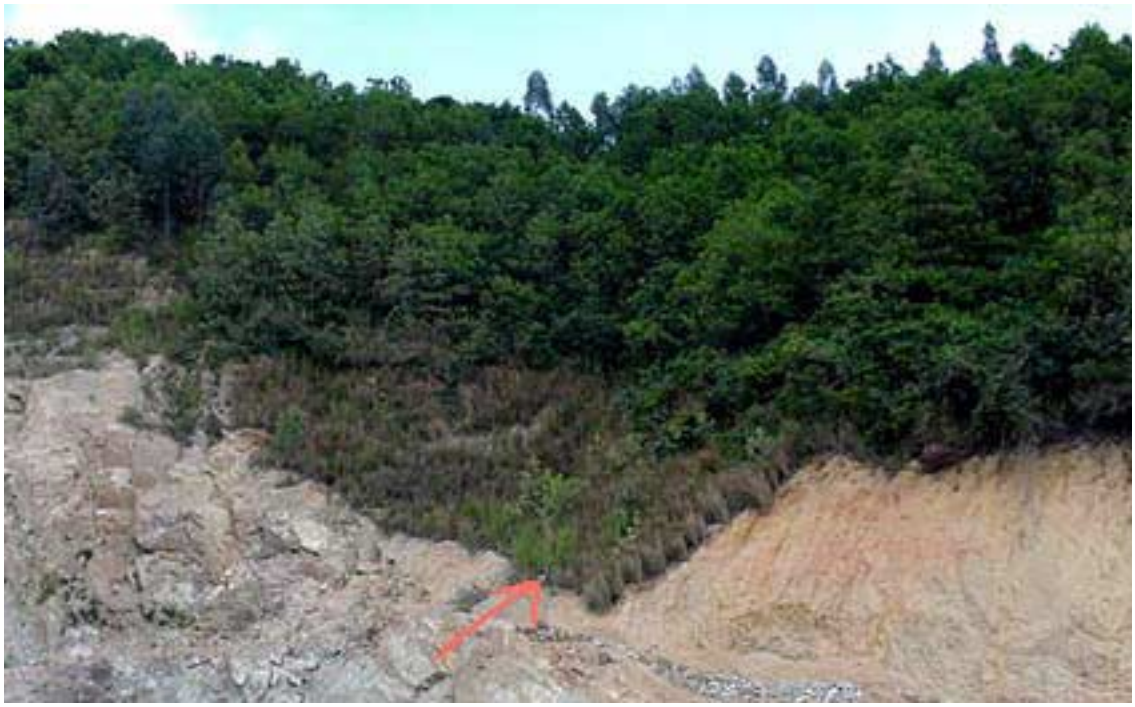
As follow up research by the University I would suggest that it examines the effectiveness of vetiver "floating islands'. There are many algae rich ponds on the University campus that are convenient to monitor and which might benefit from the results!.

The Chinese are masters of creating natural gardens and vetiver grass is now being used as a lovely ornamental grass. In this example vetiver (marked by red dots) is used alongside the edge of this lake to soften the lawn/lake interface. Because the lake level varies slightly vetiver is an ideal plant for planting in or near water.

The garden shown in these two images is part of an upscale apartment complex in Guangzhou. In this image vetiver is planted in clay pots and then inserted in this waterfall, again adding greenery and providing contrast to the water and rocks. This work is supported by the South China Agricultural University.

Guangdong Province's economic development continues at a good pace and the construction industry continually has to face the need to stabilize cut slopes as new sites are carved out of hillsides. In this case the Guangdong Huihua Environmental Science and Technology Co.. Ltd. has been contracted to stabilize 10.000 square meters of very steep cut slope. Cut off drains (upper image--red dots) have been constructed along the top and bottom of the cut slope. Ms. Xu Yuanxin, known to her vetiver friend's as Julia or Tiger 1, is President of the company. She is standing on the toe drain next to vetiver that had been planted in mid March 2002. Note the quality of the work and high survival rate. The contract rate for the vetiver planting was US $ 3.0 per square meter.

Ms. Xu Yuanxin is one of the best of China's commercial enterprises promoting VS. She is an excellent business woman and is committed to environmental improvement.



The city of Shenzhen that is located on the border with HongKong is a beautiful modern city but its landscape is marred by huge quarries cut out of the local hills. The Guangdong Huihua Environmental Science and Technology Co.. Ltd. has been contracted to show that VS can be used in quarry rehabilitation. In this image vetiver has been planted at the top of the quarry.

A close up of the bottom part of the top image shows the vetiver (V) and the native shrubs and trees (S) that have established naturally under the pioneer role of vetiver. This vetiver planting is about 1 year old. Vetiver has allowed the native plants to regenerate in the soil and moisture retained by the vetiver.

Older plantings at the same quarry. Top image shows mixture of vetiver and native shrubs and tress that have established naturally.

This image is of the slope below an oil storage shed in the quarry. No plants would grow here.

The same site three years after vetiver had been planted -- vetiver well established and native plants are developing. (cross sectional view).

Frontal view of the above site.

View of vetiver that has been eaten and killed by rats. You can see a darkish empty area between the red lines where vetiver was destroyed. This destruction seems to be of a temporary nature only when adjacent crops have been removed from the fields. It appears that there are no significant economic consequences.

Third International Conference on Vetiver (ICV3)

Following an earlier visit by Dr. Sumet Tantivejkul and Dr.. Narong Chomchalow of the ICV Continuing Committee I met with Prof Luo Fuhe (Director of Guangdong Provincial Academy of Agricultural Sciences, Mr. Hong Hao (Secretary General of Guangdong association of Grass Industry and the Environment), Mr. Lu Xiaoliang (Associate Professor of South China Agricultural University, and Dr.. Xia Hanping of South China Institute of Agricultural Botany to discuss more details relating to the ICV3 conference to be held in Guangzhou from October 6 - 9 2003.

Whilst fully appreciating that the various organizing committees would be consulted we agreed in principle on the following:

The conference would have as its theme “Vetiver and Water”. People invited to present papers at the conference would be requested to ensure that this theme would be included in their presentations. The fact is that 95% of vetiver applications have something to do with water. Thus a paper on highway stabilization would be required to indicate what impact vetiver would have on water quality and the impact of runoff and reduced sediment flows to water users lower in the watershed.

The conference would be dual language - Chinese and English - with simultaneous translation into either language.

The conference would have a major objective of the promotion of the Vetiver System to public and private agencies and businesses in China. We would thus expect many more than 200 Chinese

participants. If properly advertised and promoted as many as 1000 Chinese might attend.

So as to assure that participants receive a complete understanding of the Vetiver System, the first days plenary sessions would only six or seven major topics each focussing on a separate aspect of VS. These might include:

Welcome Address: Prof Luo Fuhe

Opening address: Audio slide show of Vetiver System in Thailand. (Dr.. Sumet)

Plenary 1 : (a) Vetiver Grass - the Basic Technology - (J.C. Greenfield) (b) Plant Propagation in China (Chinese private sector company)

Plenary 2: (a) Vetiver Systems and Agriculture (Thailand or Malawi) (b) Dabie Mountain Project (Liyu Xu)

Plenary 3: (a) Vetiver Systems and Slope Stabilization (Diti Hengchaovanich) (b) China Highway or Railway presentation

Plenary 4 (a) Vetiver Systems and Land Reclamation (Xia Hanping) (b) Stone quarry reclamation in China (Guangdong Huihua environmental Science and Technology Co. Ltd.)

Plenary 5 (a) Vetiver Systems and Pollution Control (Paul Truong) (b) Landfill stabilization (Guangzhou Rivers Enterprise Co Ltd.)

Plenary 6 (a) Other applications of Vetiver Systems (Narong Chomchalow) (b) Ornamental landscaping applications of VS (South China Agric University)

Plenary 7 (a) Vetiver Systems -- Policy Management and the Private Sector (Criss Juliard) (b) The experience of Zhejiang Province. (Zhao Zhaoqing - Director Zhejiang Provincial Vetiver Network Center)

The conference should have fewer, longer and better quality presentations. All papers submitted would be published, but not all would be presented.

Papers would be presented at the conference in a “Power Point” format. Power Point would be presented on side by side screens in English and Chinese. All papers would be translated into the alternative language (English/Chinese) as relevant.

Papers and power point presentations would need to be submitted 3 months prior to the conference so that all participants would receive at the time of registration a CD-ROM containing the full documentation. (We want participants to return to their jobs with the documentation in their hands to use without delay).

Chinese commercial VS companies should be invited to fully participate in the conference and to help promote it and be active fund raisers. We would like some significant exhibits to be displayed at the conference. All **practicing vetiver** participants should be required to exhibit posters.

There are many excellent VS sites in the vicinity of Guangzhou that can be scheduled into a field day.

Given the importance of VS technology to southern China I believe that the Chinese hosts, under the presidency of Prof. Luo Fuhe for the conference will do an excellent job.

At a subsequent meeting with the Guangzhou Municipal Science and Technology Bureau an excellent discus-

sion took place. The Bureau fully appreciated the value of VS in meeting some of the social/political needs of the population with regard to rehabilitating degraded industrial and quarry sites and making the cities and surrounds a better place environmentally to live. The Bureau agreed to support ICV3.

It was agreed that it might be worth inviting a few of the key foreign participants to remain in Guangzhou for 1 or 2 days after the conference to discuss some key issues related to VS world wide (i.e. design standards and criteria, research needs etc.)

It was agreed that TVN would republish the TVN Awards program in its next news letter and website. It would also publish the next ICV3 announcement and call for papers (expected in June 2002).

We understand that the King Of Thailand Award of $10,000 will be made to two awardees. We hope that the Thais (Narong Chomchalow/Suwanna Pasiri?) will announce the "rules" and guidelines for submissions at the same time as TVN Award announcement is made.

I will send to the ICV3 secretariat email of key VS advisers and addresses of more active TVN members together with a list of aid agencies, NGOs, and research agencies that might be interested to attend.

Other matters of interest

1. Special workshops need to be established in those active VS provinces in China to link the excellent sector focussed VS applications (i.e. in highways) to other sectors (i.e. water authorities). In this way the technology might spread more rapidly to other currently non user sectors.

2. I passed out a number of the TVN brochures that had been translated into Chinese by Huang Yu Wen and published in Taiwan. They made an instant impression and efforts should be made to publish them in China. I have sent Liyu Xu a CD-ROM with the "printer ready" files of the brochure in English.

3. There is a demand for the EMVN introduction to VS power point presentation prepared by Mike Pease and Paul Truong. I have already sent this to Liyu Xu and others on CD-ROM.

4. It was evident during my visit that downloading TVN web site files is a slow business. I have therefore sent out CD-ROMS to Chinese and others that contains: the whole of TVN's website files, TVN brochure, Bonn water conference brochure, EMVN power point presentation, and P.K.. Yoon's "Look See at Vetiver" -- the latter is in my opinion is the best research on the basics of vetiver grass that has ever been undertaken and published. I have mailed nearly 40 copies of this CD to China and to Vetiver coordinators.

5. Research is needed to look at the longevity issue relating to vetiver -- especially in regard to post planting long term management and objectives.

6. More research needs to be focussed on the vetiver and stem borer - both positive and negative. It does not appear to be a major problem to vetiver, but it might be a significant benefit to adjacent crops.

7. I received a request regarding vetiver's tolerance to molybdenum -- any response?

8. Standards need to be established for the application of vetiver in highway stabilization design. Same applies to other applications.

9. In China there is a need, as elsewhere to agree on a standard nomenclature for planting material -- i.e. a standard planting slip comprises at least three healthy tillers?

10. There is a demand and need for a TVN certificate of professional proficiency in the use of VS that certifies the experience and capability of the holder. Paul Truong raised this matter with me some months ago. I will start doing something about it as I believe that it is an excellent idea. The critical issues relate to the required criteria to meet certification, and who will be the judge that criterai have been met.

11. In China there is still some confusion as to when the are the most appropriate planting dates and seasons. I suggest that CVN (Liyu Xu) gets feedback from Chinese users on this matter and publish the findings.

12. In China distance between rows and plants (including the use of double rows) needs review and guidelines are required. Currently there is great variation of application 9based generally the more plants the safer and better will be the result (this may be expensive).

13. Liyu Xu has aked me to put some Chines VS. papers on our web site. I am prepared to do this as a trial. They can only be as pdf files or as already prepared Chinese html files. Can Acrobat produce a Chinese character pdf file?