

# VETIVERIM

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## Editorial

### From the Philippines with Love

The Editor has been invited to participate in the First Philippine Conference on Vetiver held at the Intercontinental Manila Hotel in Makati, Manila during 5-7 March 2014. It was organized by the Philippine Vetiver Network with technical support from Dr. Paul Truong, Director, Asia and the Pacific of The Vetiver Network International. The full report of the Conference is presented in this issue of Vetiverim.

Although not stated that it is an international conference, it is on par with any other international conferences for various reasons, such as the attendance of foreign participants from more than ten countries from four continents, the use of English as the language of the Conference, the full-fledge facilities of the five-star hotel, the impressive opening address by Senator Fernando R. Marcos, the very well planned program with a balance of plenary lectures, case studies and the workshops, the professional exhibitions from various government and the private sectors, the well-prepared study tour, and the most hospitable reception by the organizer.

The study tour to Anvaya Cove Beach and Nature Club, Morong, Bataan, although taking a very long time to arrive, but it was worthwhile to visit. The participants were quite relax upon seeing the most impressive surrounding of the club with green turf and calm lake having vetiver planted for propagation, which is most impressive as well as innovative, as it takes only a month for the vetiver to regenerate up to 1000 tillers in an area of 2 m<sup>2</sup>, and they are ready for planting in the field as each tiller has emerging roots such that there is no need for transplanting in the plastic bag.

All in all, the Editor is very much impressed in attending this Conference, learning a lot of new knowledge about vetiver from the experts from other countries as well as the local Filipinos. During his own presentation, he was astonished to welcome scores of questions/suggestions from the participants, which continued on to lunch break and later on. Above all, he was overwhelmed with what has been put in for the preparation of this most successful Conference such that he suggested that the Philippines should bid to be the host the Seventh International Conference on Vetiver to be held in four-years time.

## Report of the First Philippine Conference on Vetiver\*

The First Philippine Conference on Vetiver was held at the Intercontinental Manila Hotel in Makati, Manila during 5-7 March 2014. It was organized by the Philippine Vetiver Network with technical support from Dr. Paul Truong, Director, Asia and the Pacific of The Vetiver Network International. The program of the Conference consisted of two full days of technical meeting (5-6 March) at the Grand Ballroom of the International Mailan Hotel and the study tour to visit Anvaya Cove Beach and Nature Club, Morong, Bataan on the thrid day, 7 March 2014.

The technical meeting consisted of the Opening Session which was inagurated by Senator Fernando R.Marcos, Jr.. In his opening address, the Senator has brought the problem of accessibility, not only from city to city, but link with the people so that there are exchanges of idea and knowledge in orderto make the Philippines a strong nation on par with other nations in the world, particularly in the utilization of vetiver in sustainable development such as in land development, planting vetiver alongwith economic crops and preventing pollutants. It is hoped that this conference would uplift this humble plant to the one that can adjust the previously conceived idea in the environment, agriculture, infrastructure and business to a brighter future.

The technical session consisted of four plenaries, namely *Plenary 1: State of the Philippine Environment* with two presentations: (1) Requirements of Environment Stewardships: Creativity, Activism and Citizenship by Renato Redentor Constantino, Executive Director, Institute for Climate and Sustainable Cities, and (2) Overview of the Philippine Clean Water Act of 2004 by Leza Alix Acorda-Cuevas, Supervising Environment Management Specialist, Department of Environment and Natural Resources. *Plenary 2: The Vetiver System*, also had two presentations: (1) Introduction to the Vetiver System and Its Global Applications by Paul Truong, Director, Asia-Pacific, TVNI, and (2) History of Vetiver Use in the Philippines by Noah Manarang, President, VGFT Farm. *Plenary 3: The Application of Vetiver in Real Estate Development* had only one presentation, viz. Integrated Uses of the Vetiver System in Anvaya Cove Golf and Beach Nature Club by Mary Noah Manarang, Vetiver Consultant, Biosolutions, Inc. *Plenary 4: Socio-Economic Impact of Vetiver* had one presentation, viz. Socio-Economic Impact of Vetiver by Paul Truong, Director for Asia and the Pacific, the Vetiver Network International.

The other interesting activities of the Conference was the Case Studies, consisting of four presentations, namely: *Case Study 1: Treating Industrial Wastewater through Vetiver: Vetiver System Technology for Phytoremediation of Palm Oil Mill Effluent* by Negisa Darajeh, Faculty of Engineering, Universiti Putra Malaysia, Malaysia. *Case Study 2: Integrated Applications of Vetiver: Current Infrastructure Protection Projects Using Vetiver System in Vietnam* by Engr. Tran Van Man, Coordinator, Vietnam Vetiver Network. *Case Study 3: Lifestyle Application of Vetiver Grass* by Marbee Go, Publisher, Wedding Essentials. *Case Study 4: Vetiver Application with Cocofiber Products in Public Infrastructure* by Mary Noah Manarang, President, VGFT Farm.

The last activities were six Workshops, viz. *Workshop 1: Slope Stabilization* by Lalit Sawasdimongkol, Director of Engineering Geology Branch, Bureau of Materials Analysis and Inspection, Department of Highways, Bangkok, Thailand. *Workshop 2: Prevention & Treatment of Contaminated Water and Land* by Paul Truong, Director for Asia and the Pacific, the Vetiver Network International. *Workshop 3: Vetiver Grass technology for Rehabilitation of Mining Wastes and Tailings* by Paul Truong, Director for Asia and the Pacific, The Vetiver Network International. *Workshop 4: Impact of the Vetiver System Applications to Land Use and Agriculture* by Narong Chomchalow, Vetiver Expert, Office of the Royal Projects Development Board, Bangkok, Thailand. *Workshop 5: Propagation Methods of Vetiver* by Mary Noah Manarang, President, VGFT Farm. *Workshop 6: Contribution of the Vetiver System in Alleviating Climate Change Disasters* by Paul Truong, Director for Asia and the Pacific, the Vetiver Network International

Prior to the end of the Conference, "A Brief Introduction to the 6<sup>th</sup> International Conference on Vetiver" was presented by Engr. Tran Van Man, Coordinator, Vetiver Network Vietnam. It was

concluded by a brief Closing Ceremony with Closing Remarks by Mary Noah Manarang, Over-all Conference Chair.

### Excursion

The Organizer arranged a one-day excursion at the Anvaya Cove Beach and Nature Club, Morong, Bataan. The site consists of a large golf court and recreation area in which the VGFT Farm of the Organizer, Ms. Noah Manarang, is the contractor, whose task involves growing vetiver for soil and water conservation in the area along the slopes of the roads, on the bank of the ponds, etc. The most impressive works exhibited include:

(1) Vetiver propagation in the water through the use of bamboo platforms with the area of 2 m<sup>2</sup> (1x2 m). This platform accommodates 16 clumps of about 15 tillers attached by ropes to the platform. It takes only one month for the vetiver clumps to produce about 1,000 tillers, ready for transplanting.

(2) Bareroot tiller with emerging roots is ideal for transplanting in the field as each has adequate emerging roots and easy to split off from the clump as they stay in the water. It is important to plant these bareroot tillers when the soil is wet after the rain. Such practice is convenient, save the costs of labor, plastic bag, medium, and transportation to the site of planting

### Purple Vetiver

Interesting dialogues were going on recently in the E-mail concerning “Vetiver Purple”. They are presented below in chronological order:

❖ **Paul Truong <p.truong@veticon.com.au>, 11 March 2014**

During my recent trip to Vietnam and the Philippines, I noticed an ornamental grass locally known as purple vetiver, which looks like vetiver to people not familiar with vetiver, but on closer examination it is not *Chrysopogon zizanioides*.



This plant is widely used in the region including Thailand and Indonesia. I found these on an upmarket Resort in Central Vietnam and a Golf Course near Manila in the Philippines. As this plant is not a vetiver, it should not be used as a vetiver plant in the vetiver system technology.

❖ **Alberto Rodriguez (<alrod312@gmail.com>), 16 March 2014**

That looks like Purple Fountain Grass - *Pennisetum setaceum* 'Rubrum', a landscape grass that is very attractive. We have some at our farm for our own landscaping but we do not propagate it. It is easily available from garden centers.

❖ **Narong Chomchalow <naronghc@au.edu>, 16 March 2014:**

We also introduced this "Purple Vetiver" into Thailand, to be grown as ornamental plant, for example at the Wang Nam Khiao Ornamental Plants and Landscape Exhibition. They imported the seeds from the catalogue of a seed company in the US under the name of "Purple Vetiver" with no scientific name. My first look at it was that it is similar to vetiver except for its beautiful purple color. Looking close at the flower inflorescence, it resembles a noxious weed that spread out in the Northeast, which is *Pennisetum polystachyon*, known in Thai as 'Ya Khachonchop'. The seeds can be dispersed by wind as far as 5 km, but can also be spread even by attaching to the tires of automobiles to everywhere they go. It occupied a large uncultivated area such that a paper manufacturing plant has been set up at Bang Pa-In in Ayutthaya Province in the Central part to make use of the biomass of this weed for paper pulp and a large number of people were earning a good income by harvesting it and sold it to the field stations of the manufacturing company in the Northeast. This is one of the worst examples of introduced species that turned into noxious weed in Thailand in recent history. Fortunately we have less and less areas of uncultivated land such that it has ceased to play a big role as previously.

Up until now, I have not seen the 'purple vetiver' in other areas. Perhaps the seeds do not spread as much as the weedy species referred to above, or it is still too early for their adaptation and spreading. I plan to write a paper in our vetiver journal warning the scientists to be aware of its danger of becoming noxious weed as its close relative. Any one has an evident of it becoming widespread as weed?

❖ **Alberto Rodriguez (<alrod312@gmail.com>), 16 March 2014**

As mentioned in my earlier message, we have one large clump of a purple grass that is visually similar to the one shown in Paul's picture. We believe it to be the landscape **Purple Fountain Grass** - *Pennisetum setaceum* 'Rubrum', This clump has been there for many years and we have never had any natural propagation from it. Although we do not propagate it commercially, we do not consider it an invasive or problematic grass in our environment.

I would not consider using the name Purple Vetiver for this grass as it is very different in every way. The leaves are flat and grow permanently erect. The growth is evenly distributed throughout the plant with no bare areas anywhere. For us it is an excellent landscape grass and may be different from what Paul and you describe.

❖ **Paul Truong <p.truong@veticon.com.au>, 17 March 2014**

Thanks a lot, Alberto . I dont know why they call it Vetiver. I revised it as attached

### Pollution of Planet Earth's Food Supply Source\*

Did you see the recent article in The Washington Post "Chinese official: Soil pollution hurts farming" claiming that at least 8 million acres of Chinese farm land will be closed to production due to contamination by heavy metals and other contaminants, including the over use of agricultural chemicals? This problem is not just confined to China. In India ground water is not only being depleted at an alarming rate, but it is also being polluted by overuse of agricultural chemicals and by toxic effluent from industry. "A recent Punjab state water department survey found that 1,166 of its nearly 7,000 projects were contaminated with heavy metals including arsenic, uranium and arsenic beyond permissible limits". Additionally the overuse of nitrogenous fertilizer has in places seriously contaminated groundwater – the consequence - contaminated food and drinking water, and an increased incidences of cancer and other ailments. This problem also occurs in the USA. The Salinas Valley in California has serious nitrate contaminated groundwater due to years of fertilizer use for intensive agricultural cropping.

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\* By Richard Grimshaw <r.gromshw@comcast.net>.

These are just a few examples of water pollution, there are many more, at various scale on all continents. There is an awful lot of discussion and planning in an attempt to mitigate the problems; and in a few specific cases, normally associated with industrial wastewater, there are positive actions with good results. However little is done on a wide scale because of lack of political will, cost, lack of suitable technology, and the inability of communities, landowners and businesses to address the problems collectively.

The Vetiver System can provide the technology to address some of the problems. Vetiver Phytoremediation Technology (VPT) has the distinct advantage of relative low cost, low design complexity, and application over a wide range of conditions. VPT can be used for cleaning up and stabilizing mine dumps and landfills, and treating the leachate from such sites. It can be used to remove agricultural chemicals from the runoff from farmland and, preventing these chemicals from entering groundwater and surface water drains and streams. One major strength of VPT is that not only has it been proven extremely efficient in doing its job, but unlike most phytoremedial systems that are based on constructed wetlands, VPT works effectively under non wetland conditions thus allowing much wider application. VPT takes up, at high levels of concentration, most heavy metals, nitrates and phosphates and agricultural chemicals including atrazine and endosulphan.

The Vetiver System has also been proven as a technology that is liked by and is understandable to poorer communities. Thus we have examples of community use for erosion control (in many countries including Indonesia), urban ravine rehabilitation (Congo DR), wetland rehabilitation (Ethiopia), coffee coop wastewater treatment (Ethiopia), slope stabilization (Madagascar), and coastal infrastructure protection (Vietnam). Wherever used, the applications have positive bi-products that include: carbon sequestering, biofuels, mulch, and materials for handicrafts and industry - real opportunity for a WIN WIN remedial program.

The contamination of soil and water can only get worse as population increases and the demands on our land and water resources increase. It needs action by civil society as a whole and especially by communities associated with the most contaminated areas to act. There are many actions needed involving many agencies, and that action is needed now. Vetiver Phytoremediation Technology is one such technology that could be quite easily introduced on a wide scale, at minimum cost, to mitigate some of these problems.

### **Achievement of the Vetiver Network International in 2013\***

The worldwide vetiver family had another good year in 2013. It was exciting to see expanding use of Vetiver System applications in most parts of the world, often from people and places that we rarely hear from.

The year's highlight was The Second International Latin American Conference on the Vetiver System that was held in October in Medellin, Colombia, and very ably organized by Daniel Londono of the Colombian Vetiver Network. There was excellent attendance and some very interesting presentations from most of the region's countries covering various applications. It was interesting to see how individuals, communities, private companies, schools, and Universities were all making their contribution to furthering this great technology. I was personally moved by the work of Alois Kennerknecht of Lima, Peru, who, using his own money, had virtually single handed introduced VS for beautification, soil conservation, and other purposes to some very poor inner city urban communities. In Madagascar, our current "Vetiver Champion", Yoann Coppin, continues his excellent work

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\* By Dick Grimshaw, TVNI Founder and Director, <R.grimshaw@comcast.net>

with a number of cross sector applications that show what can be done when you put your mind to it! We thank the companies and individuals who contributed to the conference in kind and funds.

In late November we learned that Paul Truong had been shortlisted in the final 25 contenders for the St Andrew's Prize – an important UK environmental prize. His submission was based on his pioneering work on phytoremediation of wastewater and its potential for reducing diseases transmitted in dirty water. We will know whether he is a winner or not in May 2014. Water quality is an important area where VS can prove helpful. For example we recently learned that Techno Serve has a project in East Africa that addresses the coffee industry, including training over 120,000 Ethiopian coffee farmers in VS technology and using the VS application, that we are now calling, Vetiver Phytoremediation Technology (VPT), to treat wastewater from coffee pulping stations.

We would like to congratulate TVNI Director, Roley Noffke of Hydromulch, South Africa, for being elected as Vice President of the International Erosion Control Association (IECA) with global responsibilities outside of the US. Roley has been a great supporter of the Vetiver System; has helped fund a number of vetiver programs and vetiver training courses; has carried some large mine rehabilitation and slope stabilization works in Africa using VS; and has shown how poor local communities can significantly improve their incomes through inclusion in the production and supply of large quantities of quality vetiver plant material. His example is laudable and should be an example to many other commercial operations that use VS.

Our website continues to be very well used. It is interesting to see the growing interest from countries such as the Philippines, Italy, Brazil, Myanmar amongst others. I have been busy updating the website (something I should have done a long time ago), and have now nearly completed an additional Vetiver System Library that is in the public domain and hopefully proves easier to find vetiver information and documents. You can still use the website search engine and the Vetiver Archives – they are all interlinked.

Sadly in the past year we have lost two of our longstanding Board members and friends. Monty Yudelman who died in January 2013 was well known in international circles, having been at one time the World Bank's Director of Agriculture and Rural Development where he oversaw a massive increase in Bank agricultural lending to impoverished farmers. Then this last November Mark Dafforn, our Secretary and Director, died suddenly at far too young an age. He will be remembered particularly for his work the National Academy of Science's 1993 study – "Vetiver Grass – A Thin Green Line Against Erosion" and his work with Robert Adams on the DNA of Vetiver, as well as for the good scientific advice that he gave us all. We are setting up two awards in their names -

"The Monty Yudelman Award" and "The Mark Dafforn Award". Details will be posted shortly about the awards, but both will be open to people undertaking outstanding contributions to the Research and/or Development of the Vetiver System. The Yudelman Award already stands at \$5,000 and The Dafforn Award is at \$1000. If anyone would like to contribute you can do so either via our "Donate" button on our website <http://www.vetiver.org> or by mailing a check or money order.

The Vetiver System continues to attract a good deal of attention, and is particularly important for addressing Climate Change and Food Security issues. I firmly believe that VS is one of the most important tools for mitigating and preventing many of the land and water related environmental activities that are needed if this planet is to be a better place. We have a long way to go, and a lot of hard work remains particularly in information transfer and application. The three major legs of the Vetiver System: infrastructural slope stabilization, on farm soil and water conservation (erosion control), and treatment of contaminated land and water (phytoremediation) remain the keystones of the technology; together they address the critical areas mentioned above.

For those of you who may share this letter with your friends and interested clients you might care to read up on the history and achievements of TVNI and the Vetiver System in this document that I recently prepared.

The next big vetiver event will be the 6<sup>th</sup> International Conference on Vetiver (ICV-6) to be held in Da Nang, Vietnam in May 2015. Its theme will be "Vetiver System: Empowering Sustainable Development". It should be a very good and informative gathering, and is being ably organized by Man Tran, Vietnam Vetiver Coordinator. Mark up your diaries and join us in Da Nang.

Finally at this season of “Giving”, I would like to tell you that in the past few days we have had some generous responses to our request for funds to support the ongoing work of the Vetiver Network. Thus far we have collected nearly \$4,000. *We need more*, and I would ask those of you who have not yet made a contribution and who care about our planet, the solutions and opportunities that VS can provide, and the personal/business benefits that many of you have derived through the Vetiver Network to consider a tax deductible donation – easy to make via the secure “Donate” button on our website. Thank you all for a good year, and Greetings!

### **Vetiver on a Floating Platform Degrades Phenol in Contaminated Water\***

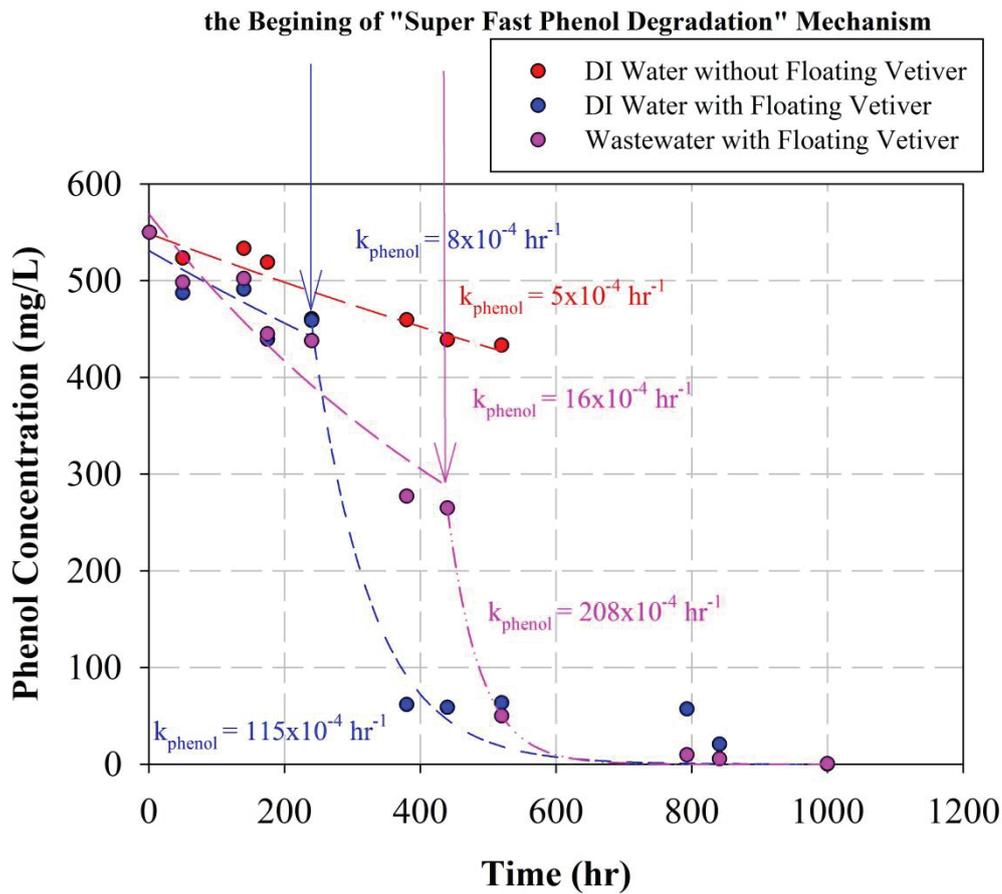
Communities at Nong Nae Subdistrict, Phanom Sarakham District, Chachoengsao Province, Thailand has been suffered from illegal dumping of industrial wastewater containing high phenol ( $C_6H_6O$ ) (as high as 500 mg/L) for more than two years. Phenol migrates from the dumping points causing contamination of shallow-well groundwater and Tat Noi Creek, the main creek of the villagers. All of the villagers there utilize shallow-well groundwater as their sole drinking water source. Various government agencies monitored the contamination and reported that phenol concentration in shallow-well groundwater exceeds the maximum contamination level (1  $\mu\text{g/L}$ ) for more than 250 times in households downstream, the direction of shallow groundwater and surface water runoff flow. Phenol is a hazardous substance causing irritation and kidney inflammation. If phenol-contaminated water is disinfected by chlorination, chlorophenols (carcinogenic substances) will be formed and pose even more serious threat to villagers’ health.

In order to protect community’s health at Nong Nae, treatment of the illegally-dumped industrial water is mandatory. Vetiver on a floating platform is a low cost environmental-friendly treatment alternative for this purpose. Prior to conducting the pilot-scaled treatment, the phenol treatability was evaluated in a laboratory. DI water and illegally-dumped industrial wastewater samples containing 550 mg/L phenol were treated with vetiver grown on a floating platform. Aqueous phenol concentrations as a function of time were measured, and degradation kinetics of phenol was determined according to pseudo first order kinetics (Figure 1).

Without vetiver, phenol degradation by hydrolysis or photocatalysis was at the rate of  $5 \times 10^{-4} \text{ hr}^{-1}$ . With vetiver, phenol degradation rates were  $8 \times 10^{-4}$  and  $16 \times 10^{-4} \text{ hr}^{-1}$  (1.6 and 3.2 times faster) for experiments in DI and wastewater, respectively. This is presumably due to the action of peroxide and peroxidase excreted from the root of vetiver. Phenol irritates vetiver root. Consequently, as a self-protective mechanism, vetiver excretes peroxide and peroxidase to degrade phenol to decrease the irritation. Interestingly, after 241<sup>st</sup> hr and 439<sup>th</sup> hr for the experiments in DI and wastewater, respectively, phenol was degraded at the rate of  $115 \times 10^{-4}$  and  $208 \times 10^{-4} \text{ hr}^{-1}$  (14 times faster than the initial degradation rate of each condition. This rapid degradation period is named “super-fast phenol degradation period”. Presumably, at this super-fast period, vetiver was severely irritated by phenol and excreted large amount of peroxide and peroxidase which speeded up phenol degradation by around one order of magnitude. Phenol concentration was decreased to meet the effluent standard (1 mg/l) within only 6 weeks. After the experiments, phenol was extracted from leaf, trunk and root of the vetiver and found very small amount of phenol remaining in the vetiver parts. This confirms that vetiver degraded phenol by enzyme-assisted degradation and not just removal by sorption. This successful laboratory evaluation gives confidence and insight necessary for conducting a pilot-scaled treatment of illegal-dumped wastewater contaminated with phenol at Nong Nae Subdistrict in the near future.

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\* By Tanapon Phenrat and Pimpawat Teeratitayangkul, Department of Civil Engineering, Faculty of Engineering, Naresuan University, Phitsanulok, Thailand.



**Figure 1. Phenol degradation kinetics with and without vetiver grass on a floating platform.**

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**To**

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