PROBLEMATIC REEDS IN STANFORD, SOUTH AFRICA

Article written by Bea Whittaker of the Stanford Conservation Trust after talks with a number of people involved in reed control in South Africa (all mentioned in this article), the DEA&DP, and research on the Internet re Phragmites and Typha control across the world. April 2014.

This article must be read in conjunction with a starter document prepared for the C.A.P.E. Estuaries programme in March 2012[1] (attached).

There are 2 problematic reeds in Stanford:

- *Phragmites australis*, or common reed. It is an aggressive, coarse perennial grass that forms dense stands along the Klein River and can grow up to 6 metres tall; and
- *Typha capensis,* or bulrush, matjiesriet, palmiet. It is a perennial marsh herb which has a very fast colonizing habit by means of creeping rhizomes. It is found in the two Willem Appel dams and is starting to appear in ditches along the R43.





Phragmites australis (left) and Typha capensis (right)

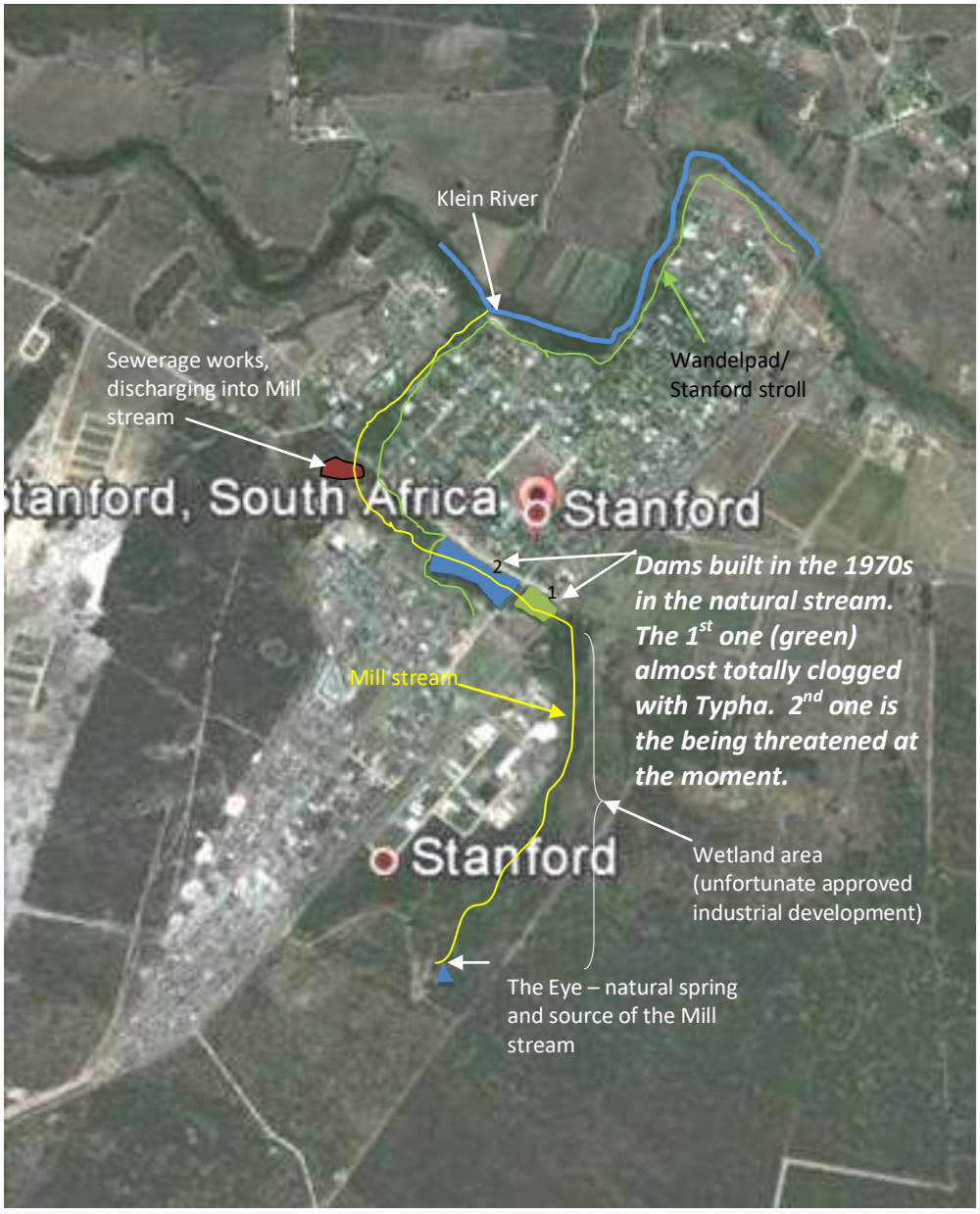
Although these species are regarded as indigenous, they are indigenous to almost every country of the world, therefore they are not considered endangered or threatened. In fact, many countries regard them as invasive indigenous species, their invasion being caused by agricultural and human practices (fertilisers and wastewater treatment works) that are continuously increasing the nutrient load in our waters.

Like all riverine and wetland vegetation, *Phragmites* and *Typha* provide food and habitat for some organisms, serve to stabilise soils against erosion, and improve water quality by filtration and nutrient removal.

However: *Phragmites* is an excellent colonizer of disturbed soils and once established it usually crowds out all other riverine plants and reduces biodiversity. Along shorelines, dense stands of *Phragmites* are objectionable because they ingress inland, obscuring water views and encroaching on naturalized and ornamental plantings. In wetlands, *Typha* colonises the water body, eventually clogging the entire waterway and driving out species that rely on a well-functioning wetland system.

[1] Anchor Environmental. *Phragmites australis control: A review of current practices and management strategies*. March 2012

STANFORD 2012





*This photograph was taken in **2001**, and is a clear indication of the reed encroachment in the past 10 years. Dam 1 is now almost totally clogged, as is the area upstream of Dam 1. In 2001 both dams were still visible from Bezuidenhout Street, as well as the dam wall. Now one only looks into a wall of Typha!*

NUTRIENT REMOVAL

With the increasing nutrient load in our waters due to chemical fertilisers and urbanisation (increasing effluent from wastewater treatment works)*, Phragmites* is useful in absorbing these nutrients and storing them.

However,rcent studies done in America[2] and China[3] have shown that, especially *Phragmites,* needs to be mowed/harvested at least every second year for it to effectively remove nutrients from the water body. This view is also expressed by Allan Liebenberg, chief environmental office of Intaka Island at Century City, Cape Town South Africa. The studies show that autumn is the best time to harvest both species as nutrients absorbed during spring/summer to promote the leaf growth and not used are re-translocated to the roots during late summer/autumn. These nutrients are then released back into the water because of the plant being dormant. Not harvesting the reeds before the re-translocation of nutrients defeats the object of maintaining stands of *Phragmites* and *Typha* for removing nutrients from the water.

The American study concluded that "*Nutrient removal by harvesting Phragmites shoots can probably be doubled without a reduction in vitality of the stands by advancing the harvest date to mid-September, which would at least approach the level of nutrient removal by harvesting Typha shoots in October*"). In South Africa this would mean that March – May is the best time to harvest both *Phragmites* and *Typha*.

RIPARIAN AND WETLAND BUFFER ZONE

Studies indicate that a 1 – 3 metre buffer of *Phragmites* and *Typha* on the perimeter of a water body is sufficient for nutrient control if managed and harvested correctly.

Klein River:

Larger inland stands of non-harvested *Phragmites* (such as along the banks of the Klein River in the Stanford municipal area) could actually increase the nutrient load in the water during autumn when excess nutrients are re-translocated to the roots at the same time that they become inundated due to the rising water level (winter rainfall) and the estuary mouth being closed.

For effective nutrient removal and aesthetical and recreational pleasing purposes it would be ideal to have a combination of *Phragmites* and other natural riverine vegetation[4] (as which is establishing itself is areas where *Phragmites* is controlled on a section of the Klein River embankment at the moment) (refer to Figure A).

[2] Toet S, Bouwman M, Cevaal A, Verhoeven JT: *Nutrient removal through autumn harvest of Phragmites australis and Typha latifolia shoots in relation to nutrient loading in a wetland system used for polishing sewage treatment plant effluent.*

[3] Zhao Y, Yang Z, Xia X, Wang F: *A shallow lake remediation regime with Phragmites australis: Incorporating nutrient removal and water evapotranspiration.*

[4] Diana H. Cross and Karen L. Fleming: *Control of Phragmites or Common Reed*. United States Department of the Interior, Fish and Wildlife Service: Fish and Wildlife Leaflet 13. Washington, D.C. 1989



Figure A:

Within 2 years of harvesting Phragmites along a small section of the Klein River, this natural riparian vegetation (including the Kiggelaria Africana (wild peach), arum lilies and sedges) established itself without any human intervention.

Phragmites should also be prohibited from ingress into the water body as the sediment trapped in the reeds form islands as well as new 'land' along the river banks (see Figure B). This could narrow and eventually choke the water channel to such an extent that it increases flood risk to adjacent properties due to the ability of water to always find the easiest route during flood conditions.

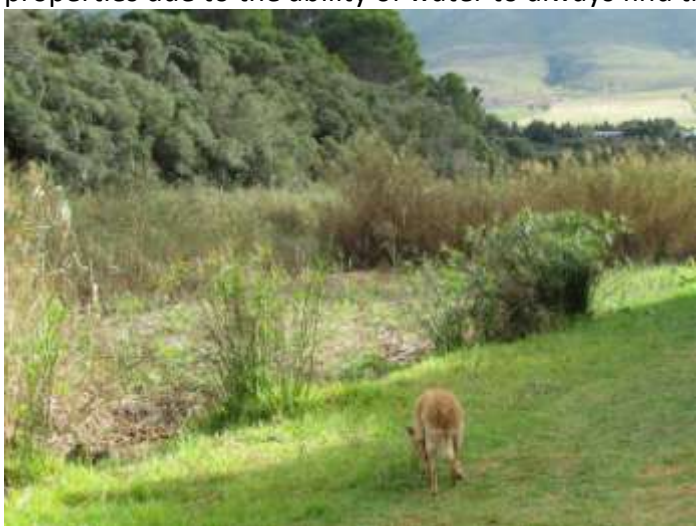


Figure B:

The original river bank is clearly demarcated by means of the riparian vegetation (sages) re-establishing itself naturally. Behind is a solid land mass formed by Phragmites ingress into the river, totally devoid of any type of other riparian vegetation than Phragmites.

Phragmites ingress is caused by long stems falling into the water, waiting for the ideal depth in which to root and extend the growth into the river (Figures C and D). New shoots start growing on each node and as soon as they make contact with soil it starts the unwanted and unnecessary extension of the reed colony.





Figures C and D:

A Phragmites stem has fallen into the water. The close-up clearly shows the new stems sprouting from each node and just waiting to anchor itself to some shallow land mass by the roots also sprouting from each node.

Although new colonies of *Phragmites* may be formed by seeds being dispersed and germinating during spring in exposed moist soils, most land ingress takes place by means of the vigorous rhizome growth (see Figure E). Invasion by below-ground rhizomes can result in dense clones with up to 200 stems/m^2.



Figure E:

Note the strong Phragmites rhizome system that flourishes in the moist, sandy soil next to a river



Figure F:
The dense Typha rhizome root system

<u>Willem Appel Dam wetlands</u>

The upper of the two dams/wetlands (between the R43 and Church Street) is almost completely covered with *Typha*. Its vigorous rhizome (see Figure F) has been allowed to grow unabated with a feared loss of biodiversity (we don't see the otter any more). It is also thought to be the breeding place of the endangered Leopard Toad. With *Typha's* ability to clog up the entire system, there is a fear that it will have a detrimental impact on the flow of water through the wetlands systems and in the Mill Stream where it dilutes the effluent from the wastewater treatment works before flowing into the Klein River. The water that flows through these systems originates from The Eye and the water quality at the Eye (Stanford's only source of potable water for more than 150 years) is of such a high standard that it does not require any treatment prior to being used as potable water.

At present *Typha* (and *Phragmites* to a lesser extent) is rapidly encroaching into the second wetland area, one that is regarded by Birdlife South Africa as a birding hotspot (see Figure G). Urgent steps need to be taken to stop any further ingress into the water system, and in fact some areas in the second wetland should be harvested as soon as possible. Care needs to be taken not to disturb the birdlife on the dam.



Figure G:

Dam/Wetland 2 with the 'leiwater' intake in the front.

REED CONTROL

Both reed species must be restricted from forming more than 1 – 3 metre thick stands along water bodies – depending on the nutrient removal function it has to fulfil. Anything in excess should be harvested and not allowed to ingress landwards or into the water body and all identified stands of *Phragmites* and *Typha* should be harvested at least every 2 years to optimise their nutrient removal function.

Ingression into the water body

Any ingression into the water body should be curtailed by cutting off reeds/rhizomes to a depth greater than 500 mm below the water surface, as this 'drowns' plant regrowth. Various methods may be used, all dependent on the type of water body.



Figure H:

Dutch mechanical reed harvesting measures. Note the hedge-cutter type mechanism with which the reeds are cut – a similar concept to the trimmer available in South Africa and that can be attached to a brush cutter.

In a natural system with a deep water channel, the use of brush cutter with a hedge-cutter type blade is an effective tool (used at Intaka Island wetland system). Once submerged below 500 mm of water, re-growth does not take place. In dense stands with limited access control, land-based water spraying (a mobile pump and spray unit was used for Grootvaly at the Blesbokspruit RAMSAR site[5]) (refer to Figure I) or aerial spraying is the most effective.



Figure I: *Spraying Typha in Grootvaly (Blesbokspruit) and the result 16 days later*

[5] Stan Madden , stmadden@telkomsa.net : A Trial Management Plan to Control Reed Encroachment in Wetlands. 9 May 2013

Inland ingression

As previously mentioned, any ingression of *Phragmites* and *Typha* further than 2 – 3 metres landwards does not really contribute to nutrient removal from a water body. For recreational, aesthetic and maintenance purposes, such ingression should be curtailed by harvesting.



Figure J:

A test opening of 2 metres wide indicated that the unabated landward Phragmites ingress in this area along the Klein River is already 26 metres… and increasing

Measures to curtail inland reed ingress include mechanical root/rhizome removal (not allowed in South Africa without an environmental authorisation), burning (high fire risk in urban areas), and harvesting (mowing down by various methods) with regular herbicide application.

The most effective and preferred method for inland ingression, especially along the Klein River, is a combination of harvesting during autumn and herbicide application during spring.

NEMA

According the South African National Environmental Management Act (NEMA), Act No. 107 of 1998, one is not allowed to remove more than 300m^2 of indigenous vegetation (both *Phragmites* and *Typha* are classified as indigenous) without environmental authorisation. For various reasons the authorities in the Western Cape interpreted the act of harvesting (mowing, cutting down of reeds) as being subject to this regulation, and therefore requiring an environmental authorisation.

However, as the cutting down (harvesting) of reeds does not involve any mechanical removal of the root system and does not disturb one grain of soil, the 300m^2 regulation is not applicable to the control of *Phragmites* and *Typha* both landwards and/or into the water. This was confirmed in a telephonic conversation with Mr Eldon van Boom from the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) in September 2013, and the information was conveyed to the Overstrand Municipality (OM) during a Ward 11 Committee meeting in November 2013. The Overstrand Municipality has agreed to obtain an official answer on this matter, and the Stanford Conservation Trust is still awaiting a reply.

Further confirmation that harvesting does not require an environmental authorisation was obtained from Stan Madden, contracted by WESSA to control reed encroachment in Blesbokspruit, a RAMSAR site close to Nigel in South Africa.

However, it must be emphasised that uncontrolled and insensitive harvesting of reeds will damage the biodiversity of aquatic systems. Therfore reed removal must be subject to an agreed plan of action drawn up between the various parties concerned.

ECOLOGICAL SERVICES

Socio-economic

Apart from being used for composting material, *Phragmites* has very little economical benefit. *Typha*, on the other hand, has several socio-economic benefits[6]. It can be used as a subsistence crop as all parts of the plant can be eaten (and is grown as a speciality food source in America). The fleshy, spongy rhizomes are dug up and dried and then pounded to a meal and used as a source of starch. The pollen may be used as a high-protein food, and in Japan the pollen is used to produce a plant growth regulator. In the past the leaves were used for caulking barrels, making hand brooms, weaving and for insulating the roofs of early houses in the Cape. After dipping in kerosene the female inflorescences can be used as torches, or they can be used as decorative dry flowers. The floss can be used for stuffing and padding. The plants have also been used to make paper.

Medicinal

According to Voight, a decoction of *Typha* rhizomes is used for venereal diseases or during pregnancy to ensure easy delivery: decoctions are taken orally or applied externally to promote expulsion of the placenta. It is also said to strengthen uterine contractions and also may be taken to promote fertility in women, to enhance male potency and libido, to improve circulation and to treat diarrhoea and dysentery.

INCREASING THE FLOOD POTENTIAL

When managed correctly, stands of *Phragmites* can slow down flood waters. However, thick stands of impenetrable stands can actually increase flood damage upstream, as was the recent case (November 2013) in Stanford. Figure K shows the wall of reeds where the Mill Stream flows into the Klein River. This 'wall' was caused by the mass of dead Phragmites material between the sewerage outlet works and the R43, as no harvesting has ever been done.



Figure K:

The confluence of the Mill Stream and the KleinRiver is approximately 4 metres to the right of the thick clumps of debris being cleared after the November 2013 floods

[6] Voight, Werner: Harold Porter National Botanical Garden. August 2007

Figure L below is an excellent image of how unabated ingress into the water is slowly but surely building on impenetrable impediment in the river. Once allowed to stretch from the one side of the river bank to the other, flood waters will dam up behind it, causing unnecessary flood damage to the residential houses close to the river bank.



Figure L:

Continued ingress will soon see this section of the river totally overgrown with Phragmites. The existing 'peninsula' already is more than 12 metre into the river.