The highly invasive *Glyceria maxima* is threatening the Maloti-Drakensberg wetlands

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Glyceria maxima (also known as great mann grass and *Poa aquatica*), occurs in several Maloti-Drakensberg wetlands. Although this species has high erosion control and forage production values, it is extremely invasive. Unless measures are taken soon to curb this species, it is likely to considerably increase in extent and abundance, which will be devastating for biodiversity.

This species should not be intentionally spread or promoted

Synonyms

Glyceria aquatica (L.) Wahlb, *Glyceria spectabilis* Mert. & Koch, *Molinia maxima* Hartman, *Panicularia aquatica* (L.) Kuntze, *Poa aquatica* L. (see).

Common names

Glycérie aquatique (French), great mann grass, reed mannagrass, reed meadow grass, reed sweet grass (English), Wasser schwaden (German).

Description

Glyceria maxima is a perennial rhizomatous grass with unbranched erect stems up to 1.0-2.5 m. Leaf sheaths have prominent midribs and visible transverse veins and leaf blades are shallowly grooved with prominent midribs. Leaf margins have short, stiff hairs which are rough to the touch. Leaves are bright green but sometimes tinged with red. Spikelets are 6-12 mm long and the inflorescence is a panicle which can be opened or contracted and the inflorescence branches have short, stiff hairs similar to those of the leaf margins.

Invasive potential

Glyceria maxima is known to be one of the most invasive grasses worldwide. It is a native of Eurasia, and has become a threat to wetland biodiversity where introduced, including North America, New Zealand and Australia. Its dense monospecific stands are capable of rapidly outcompeting native wetland vegetation. In addition, through its expanding root mat, *Glyceria maxima* is particularly well adapted to growing out into areas of open water, whether in dams, lakes or in flowing streams and rivers. Small streams and those that are not very fast flowing can become completely overgrown. In this manner, the plant works as an ecosystem engineer, with the ability to convert sections of fast-flowing aerobic streams into partially anaerobic swamps. It is of particular threat to native vegetation in permanently saturated areas as well as invading aquatic environments, which is to the detriment of aquatic macroinvertebrates and other fauna.

Glyceria maxima is strongly favoured by human impacts on wetland and aquatic systems. Newly created shallow standing water resulting from impediments to flow, e.g. from road crossings, weirs and dams, provides ideal habitat. Physical disturbance of wetland vegetation also creates "space" into which the grass can more easily invade. Increased nutrients (e.g. through leaching from fertilized fields) further favours the rapid vegetative spread of the plant. Based on the sites examined in the Maloti-Drakensberg, impediments to flow appear to be the most important contributing factor.

Invasion pathways

The seeds appear to be distributed primarily by water, less so by wind, and may also be distributed on the feet of birds, on livestock as well as in mud on machinery. Locally the plant spreads through vegetative expansion, and it is also conceivable that pieces of floating mat broken off by high flows in a river could be transported great distances downstream and then become established.

Potential impacts

Not only are the direct impacts on biodiversity considerable, but the grass also has the potential to result in impacts to the agriculture and sport fishing industries. Although it provides forage, mortality of valuable dairy cattle in the Underberg area have been directly linked to prussic acid poisoning from *G. maxima*. Fish would be negatively impacted upon by *G. maxima* through its impact on the habitat and food supply of the fish.

Reasons for its introduction

The plant is introduced both as a forage for livestock and as an ornamental plant. In South Africa it would appear to have been introduced as a forage species, as will be explained in the following section.

However, in contrast to the situation in New Zealand, the planting of this species was confined to a relatively localized area, and no record could be found of it having been introduced through government channels, i.e. through Department of Agriculture.

Extent in the Maloti-Drakensberg planning area

During the course of a Maloti-Drakensberg Project survey of 104 wetlands in the Maloti-Drakensberg planning area, *Glyceria maxima* was discovered in one of the wetlands in the Mkomazi catchment near Mpendle, and was particularly abundant around the margin of a dam in the wetland. Based on further investigation in the field and contacting farmers telephonically, it was located at several other sites, one site also in the Mkomazi catchment on the Luhane River, three in the Underberg/ Himeville/Pevensey area in the Mkomazi and Mzimkulu catchments and three sites in the Kokstad/Franklin area in the eastern portion of the Mzimvubu catchment. Although further investigation is required, it appears that it was introduced as a planted pasture grass by a farmer in the Underberg area over 70 years ago. Some farmers have had it on their farm for over 60 years. It was not found in any of the wetlands recently surveyed in the western portions of the Mzimvubu, namely the Mooi River and Wildebeest subcatchments nor has it been located in any catchments north of the Mkomazi. While it is likely to be present in more sites than the eight already identified, its distribution appears to be restricted to a radius of approximately 150 km.

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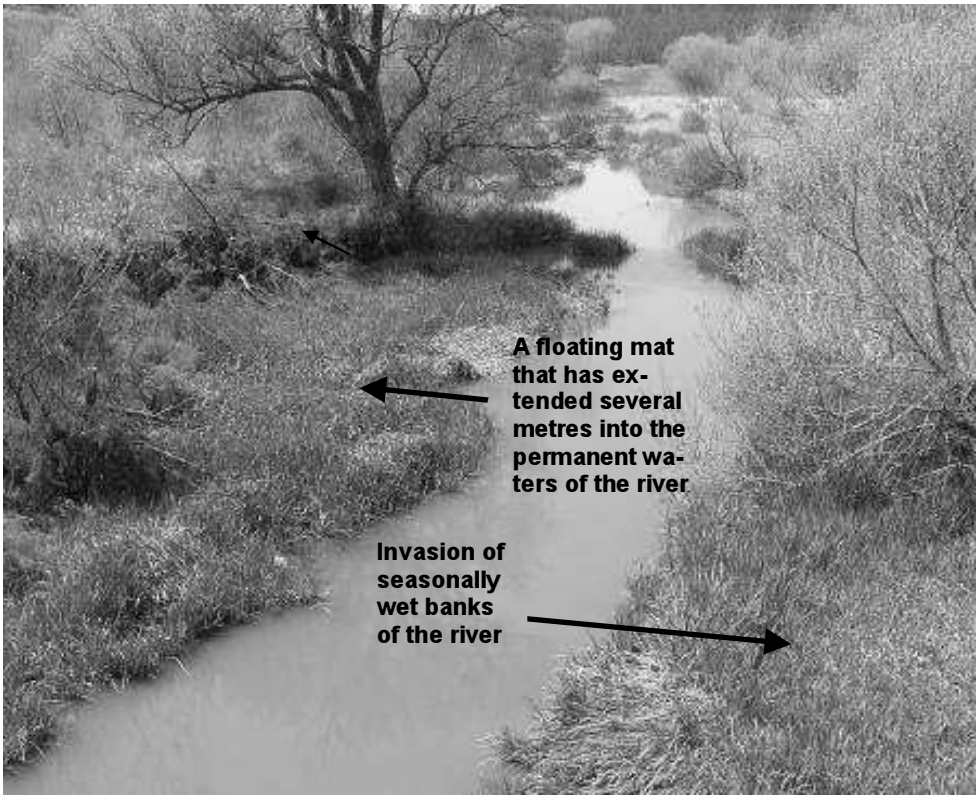
Presently it appears to be confined mainly to the general area extending from where it was introduced over 60 years ago as a wetland pasture for livestock. If it had been more widespread than this then it was bound to have been discovered sooner or later. It is a conspicuous plant in several respects that is not easily confused with any existing species present in the Maloti-Drakensberg planning area.

It flowers widely and is morphologically quite distinct from any other grass species. Vegetatively it somewhat resembles *Echinochloa* spp. but its inflorescence is distinctly different from species in this genus.

It is tall-growing and forms large, dense stands.



Invasion of a river situation

Its commonly occurs as a floating mat growing out into open water areas, with this unusual ability being unmatched by any other grass in the Maloti-Drakensberg area.

Furthermore, the KwaZulu-Natal portion of the Maloti-Drakensberg, where all the known sites are located, has been botanically relatively intensively sampled. Yet despite this and the conspicuous nature of the species, no records of its occurrence in South Africa existed until very recently. Furthermore, Milton (2004) does not list it as one of the invasive grasses present in South Africa. It is argued that had this species been present more widely, it would have been recognized as something different from known hydric grass species, and it would eventually have been collected and identified. But no such records existed until its recent discovery.

Its potential to invade in the future

It would appear that much of the distribution of *G. maxima* can be explained through the passing on of vegetative material amongst farmers, but evidence suggests strongly that dispersal has also taken place naturally from some of the sites of introduction. Based on what is reported in the literature, further natural dispersal would appear likely. Given that *G. maxima* is already present in three major catchments, its potential to expand is considerable.

Based on the evidence at the invaded sites as well as that reported in the literature, it is not being melodramatic to say that across a large part of the low to mid altitudes of the Maloti-Drakensberg, *Glyceria maxima* has the potential to radically change the habitat of both palustrine (marsh) wetlands as well as stream/river systems, particularly mid to low order streams that are slow flowing. Thus, it is considered a very high priority that a well planned and swiftly implemented strategy be developed to eradicate this species. A major awareness campaign targeted particularly at farmers is also required.

Control methods

Roundup Biactive or Weedmaster 360 are listed as the permitted herbicide to use against *G. maxima* in New Zealand, and the recommended technique is Foliar spray without surfactants. Dense revegetation with local native species is also suggested to limit re-invasion.

Invasion of a palustrine (marsh) situation