



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

EdTM

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MINISTER OF WATER AND SANITATION

NATIONAL ASSEMBLY: QUESTION 999 FOR WRITTEN REPLY

A draft reply to the above mentioned question asked by Mr L J Basson (DA) is attached for your consideration.


DIRECTOR-GENERAL

DATE: 19/07/2017

DRAFT REPLY APPROVED/AMENDED



MRS NP MOKONYANE
MINISTER OF WATER AND SANITATION

DATE: 21.06.17

NATIONAL ASSEMBLY

FOR WRITTEN REPLY

QUESTION NO 999

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(INTERNAL QUESTION PAPER NO. 15)

999. Mr L J Basson (DA) to ask the Minister of Water and Sanitation:

- (1) Whether her department has put any operational plans in place to address the infestation of hyacinth plants at the Roodeplaat Dam; if not, why not; if so, what (a) are the full details of the operational plans and (b) is the timeframe for cleaning and prevention of hyacinth;
- (2) whether any monitoring mechanisms have been put in place to monitor the incidence of any other invasive species at the specified dam; if not, why not; if so, what are the relevant details;
- (3) whether her department issued any legal mandates to keep dams and waterways clean and devoid of invasive species; if not, what is the position in each case; if so, in each case, what are the relevant details? NW1127E

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REPLY:

- (1) Working for Water: Department of Environmental Affairs (WfW: DEA) has been actively involved with the controlling and eradicating invasive weeds in Roodeplaat Dam and has developed a plan to realise this. From 2007 to 2010, the level of weeds has been reduced from 100% to about 5% through their interventions. Working for Water has spent more than 4 Million towards this. Furthermore Working for Water is providing herbicides to land owners through Department of Public Works office on site to control invasive species. Refer to **Annexure A** for the Strategic Plan.
- (2) Monitoring is done by the project manager for Working for Water in the Department of Environmental Affairs.
- (3) My Department has developed Resource Management Plans for management of Access and Use of State Dams. As part of the plan it is proposed that for each dam, that has boating recreational use, the Department should build a washbay to wash the boats from other dams to controls and contain invasive weeds. Moreover my Department is currently finalising Regulations for Access and the Use of State Dams.

Furthermore, land owners are mandated by NEMBA (National Environmental Management Biodiversity Act 10 of 2004) together with the Alien and Invasive Species Regulations that came to effect on 1 October 2014, which both give the responsibility to the land owners to develop management plans to control and eradicate invasive species including the budget to realise the above. To this effect, there is a Memorandum of Understanding (MoU) signed between the Department of Environmental Affairs and my Department to map out how this should be achieved. Continuing engagements are in place to this effect. Refer to **Annexure B** for the signed MoU.

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**STRATEGIC PLAN FOR THE INTEGRATED
CONTROL OF
AQUATIC WEEDS IN ROODEPLAAT DAM
SECOND DRAFT
31/10/2014**

Compiled by Debbie Sharp



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA



Patron in Chief:
Nelson Mandela

EXECUTIVE SUMMARY

Department of Water Sanitation (DWS) is responsible, under the National Water Act, to control aquatic weeds and invader plants on all open water systems, excluding privately owned reservoirs. The Natural Resource Management (NRM) Programmes, under Department of Environmental Affairs (DEA), is responsible for implementing the control activities and operations.

There are ten categorized invasive aquatic weed species in South Africa (Henderson, 2001), but most widely distributed aquatic weeds on Roodeplaat dam, and those with the higher priority are Water hyacinth (*Eichhornia crassipes*), Red water fern (*Azolla filiculoides*), Kariba weed (*Salvinia molesta*), Water lettuce (*Pistia stratioides*) and Parrots feather (*Myriophyllum aquaticum*). The emerging aquatic weeds such as Dense aquatic weed (*Egeria densa*), Pickerel weed (*Pontederia cordata*), Giant Spanish weed (*Arundo donax*), Spiked water milfoil (*Myriophyllum spicatum*), Watercress (*Rorippa nasturtium-aquaticum*), Alligator weed (*Alternanthera philoxeroides*) and Duckweed (*Lemna* sp.) need to be considered.

This strategy will be developed to assist the aquatic weeds manager in adopting the most effective method (s) for the control of invasive aquatic plant species on Roodeplaat dam. The main focus of this document is water hyacinth; however, control methods for Water lettuce, Salvinia, Azolla and Parrot's feather are discussed. Further, emerging aquatic weed species, most notably submerged species are highlighted, with emphasis on spiked water milfoil. This document arose from a need to coordinate water weed control efforts on Roodeplaat dam. The decision support system presented here should be regarded as flexible and should be adjusted as conditions alter or new technologies are developed.

The objective of this programme is to ensure that an integrated control strategy is developed and correctly implemented on Roodeplaat dam, which forms part of Water Management Area (WMA) 3 – Crocodile west/ Marico. The programme forms a part of an overall integrated weed management programme, where biocontrol is seen working alongside traditional chemical and mechanical control methods.

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INTRODUCTION

Aquatic weeds have become an increasing concern in all water use types. There are ten known invasive aquatic weed species in South Africa (Table 1) (Henderson, 2001), but most widely distributed aquatic weeds on Roodeplaat dam, and those with the most priority are Water hyacinth (*Eichhornia crassipes*), Red water fern (*Azolla filiculoides*), Kariba weed (*Salvinia molesta*), Water lettuce (*Pistia stratioides*) and Parrots feather (*Myriophyllum aquaticum*). All are native to South America and, with the exception of parrot's feather, are free-floating macrophytes.

Water hyacinth disrupts all normal activities associated with water use, and causes substantially increased water losses through transpiration. If left uncontrolled, it can disrupt water abstraction, destroy fishing grounds, prevent ships from docking, cause rapid siltation of water bodies, block irrigation channels and hydro-electric turbine coolant intakes (Navarro and Phiri 2000) and devastate aquatic biodiversity (Midgely et al 2006). Water hyacinth infestations threaten economic development in many resource poor countries of the world (Hill 1999). Water hyacinth has been a major problem on Roodeplaat dam since the early 1990's. Methods employed include manual and mechanical harvesting, herbicide application, biological control and several attempts to integrate all available control methods. One of the perennial problems with Roodeplaat dam has been the lack of coordination, especially given the fact that there are so many interested and affected parties involved.

The control of emerging aquatic weeds are becoming an increasing concern and Spiked water milfoil (*Myriophyllum spicatum*) is an example in the more temperate regions.

An Advisory Committee is a crucial aspect to facilitate the coordination of the operational activities on this system. The Terms of Reference for this committee is found in Appendix I.

Eutrophication is the process of excessive nutrient enrichment of waters that typically results in problems associated with aquatic plants, algal and cyanobacterial growth (Gerber *et al.*, 2004). The exponential growth of aquatic weeds is directly related to the eutrophication of the aquatic system. There are two forms of eutrophication. Natural eutrophication depends only on the local geology and natural features of the catchment. Cultural eutrophication is associated with human activities that accelerate the eutrophication process beyond the natural rate of eutrophication by increasing the nutrient loads into the aquatic systems (Gerber *et al.*, 2004). Increased nutrient

enrichment can arise from both point source and non point sources such as pollution points or internal sources such as the system's own sediments that can release phosphates. The National Eutrophication Monitoring Programme (NEMP) specifically addresses the monitoring requirement in respect of eutrophication (Gerber *et al.*, 2004).

Table 1. The invasive aquatic weed species found in South Africa (ex Henderson, 2001)

Scientific name	Common name	Family	Origin	NEM:BA	CARA Act
<i>Azolla filiculoides</i>	Red water fern	Azollaceae	Tropical S. America	1b	Category 1
<i>Egeria densa</i>	Dense aquatic weed	Hydrocharitaceae	South America	1b	Category 1
<i>Eichhornia crassipes</i>	Water hyacinth	Pontederiaceae	Tropical S. America	1b	Category 1
<i>Elodea canadensis</i>	Canadian aquatic weed	Hydrocharitaceae	Temperate N. America	1b	Category 1
<i>Hydrilla verticillata</i>	Hydrilla	Hydrocharitaceae	Asia	1a	Not categorised
<i>Lemna sp.</i>	Duckweed	Lemnaceae	Unknown	Not listed	Unknown
<i>Myriophyllum aquaticum</i>	Parrots feather	Haloragaceae	South America	1b	Category 1
<i>Myriophyllum spicatum</i>	Spiked water-milfoil	Haloragaceae	N. America, Europe, Asia and N. Africa	1b	Category 1
<i>Pistia stratiotes</i>	Water lettuce	Araceae	S. America (Brazil)	1b	Category 1
<i>Pontederia cordata</i>	Pickereel weed	Pontederiaceae	N., C. And S. America	1b	Category 3
<i>Nasturtium officinale</i>	Watercress	Brassicaceae	Europe	2	Category 2
<i>Salvinia molesta</i>	Kariba weed	Salviniaceae	S. America (Brazil)	1b	Category 1
<i>Vallisneria spiralis</i>	Tapeweed	Hydrocharitaceae	S. America	Not listed	Not categorised

OBJECTIVES

The objective of this programme is to ensure that an integrated control strategy is developed and correctly implemented to address current haphazard control methods on Roodeplaat to ensure efficient utilization of resources and protection and

enhancement of the natural environment. The programme forms a part of an overall integrated weed management programme, where biocontrol is seen working alongside traditional chemical, hydrological and mechanical control techniques. The water quality monitoring programme data will be utilised to inform an early warning system to support the control operations.

AQUATIC WEEDS

1. *Eichhornia crassipes* (Water hyacinth)

Water hyacinth is the most important aquatic weed in South Africa and it was first recorded in the country around 1900 (Plate 1). This invasive alien plant grows in all types of freshwater systems. Water hyacinths vary in size from a few centimetres to over a metre tall. They have purple flowers. Water hyacinth leaves are rounded and leathery, attached to spongy and sometimes inflated stalks. The plant has dark feathery roots (Henderson, 2001).

Three control methods have been implemented against water hyacinth, manual removal and mechanical control, the application of herbicides and biological control and more recent attempts have been made to integrate these control methods (Jones 2001).

The prior lack of enemies and the presence of nutrient enriched waters have facilitated its spread throughout South Africa. Its first biocontrol agent, *Neochetina eichhorniae* Warner, was released in 1974 (Henderson, 2001). However, *N. eichhorniae* was deemed unlikely (by Plant Protection Research Institute (PPRI)) to achieve the desired level of control on its own, and thus three additional biocontrol agents were later released and established. There has been considerable work done on biocontrol of water hyacinth by PPRI due to public and environmental pressure to address the problem of the quick invading aquatic weed. All five the agents are considered established by PPRI in the areas where they have been released. The agents are listed in Table 2. Refer to map of distribution and existing release sites (Appendix II). The spread, impact and control of water hyacinth have been summarised in proceedings of several workshops (e.g. Greathead and de Groot 1993, Charudattan et al. 1996, Hill et al. 1999, Julien et al. 2001) book chapters (e.g. Center et al. 2002, Cilliers et al. 2003) and several review papers (e.g. Cilliers 1991, Hill and Cilliers 1999, Hill, 2003).



Plate 1. *Eichhornia crassipes* showing flower (a) and a dense mat of water hyacinth (b).

Table 2. The biological control agents available for Water hyacinth (Olckers and Hill, 1999; Henderson and Cilliers, 2002).

Biocontrol agent	Degree of control	Established	Agent type	Main feeding guild	Damage to weed
1. <i>Cercospora rodmanii</i>	Substantial	Yes	Fungus	Causes leaf spots	Considerable
2. <i>Cercospora piaropi</i>	Considerable	Yes	Fungus	Causes leaf spots	
2. <i>Eccritotarsus catarinensis</i>	Substantial	Yes	Mirid	Sap sucker	Considerable
3. <i>Neochetina bruchi</i>	Substantial	Yes	Bruchid	Stem borer	Considerable
4. <i>Neochetina eichhorniae</i>	Substantial	Yes	Bruchid	Stem borer	Considerable
5. <i>Niphograptia albiguttalis</i>	Substantial	Yes	Moth	Petiole borer	Considerable
6. <i>Orthagalumna terebrantis</i>	Substantial	Yes	Mite	Leaf miner	Considerable
7. <i>Cornops aquaticum</i>	Substantial	No	Hopper	Leaf chewer	Considerable
8. <i>Megamelus scuttularis</i>	Substantial	No	Mirid	Sap sucker	Considerable

2. *Azolla filiculoides* (Red water fern)

Red water fern (Plate 2) was introduced into South Africa from South America in 1947 as a fish pond plant. The lack of natural enemies and the presence of enriched waters, however, lead to its inevitable spread by man, waterfowl and flooding. By 1998, the National Botanical Institute had recorded the weed at over 180 localities throughout the country. There has been considerable work done on biocontrol of red water fern by PPRI, due to public and environmental pressure to address the problem of the quick invading aquatic weed. There is a very successful biocontrol agent available for red water fern. The frond feeding weevil, *Stenopelmus rufinasus*, was collected in Florida in the USA and imported into quarantine in South Africa in late 1995. Following host specificity testing, the weevil was released in December 1997 and is now fairly widespread. The weevil is available from the various biological control agent rearing stations. The weevils should be introduced between September and end of April. No other control methods are necessary for this weed. Refer to map of distribution and existing release sites (Appendix II).



Plate 2. *Azolla filiculoides* close up (a) showing the biocontrol agent and a dam (b) covered by a dense mat of red water fern.

3. *Salvinia molesta* (Kariba weed)

There has been considerable work done on biocontrol of Kariba weed due to public and environmental pressure to address the problem of the quick invading aquatic weed. Kariba weed is a floating, rootless aquatic fern that consists of horizontal stems that float just below the water surface, and produce at each node, a pair of

floating or emergent leaves (Plate 3). Floating and emergent leaves are green in color and ovate to oblong in shape. Plants bear a third leaf that is brown, highly divided and dangle underwater. Submersed leaves are commonly mistaken as roots. They may grow to great lengths, and by creating drag, act to stabilize the plant. There is a very successful biocontrol agent available Kariba weed, it is a weevil called *Cyrtobagous salviniae*. The weevil is available from the various mass rearing stations in South Africa. The weevils should be introduced between September and end of April. No other control methods are necessary for this weed.

Refer to map of distribution and existing release sites (Appendix II).



Plate 3. *Salvinia molesta* (a) forms dense mats in rivers (b) and dams

4. *Pistia stratiotes* (Water lettuce)

Water lettuce is a floating plant. Water lettuce occurs in lakes, rivers and canals, forming large dense mats. As its name implies, water lettuce resembles a floating open head of lettuce (Plate 4). Water lettuce has very thick leaves. The leaves are light dull green, are hairy, and are ridged. There are no leaf stalks. Water lettuce roots are light-colored and feathery. Its flowers are inconspicuous. There is a very successful biocontrol agent available water lettuce, it is a weevil called *Neohydronomus affinis*. The weevils should be introduced between September and end of April. These weevils are available from numerous mass rearing facilities in South Africa. No other control options are necessary. Refer to map of distribution and existing release sites (Appendix II).



Plate 4. *Pistia stratiotes* (a) can form dense mats (b).

5. *Myriophyllum aquaticum* (Parrots feather)

Parrots feather is an emersed plant that trails along the ground or water surface (Plate 5). It is easy to see why this plant is called parrot feather: its delicate, feathery, bright green leaves grow in profusion. Parrot feather leaves are oblong, deeply cut and feathery looking. The leaf color is bright blue-green. Like most water milfoils, parrot feather leaves are arranged in whorls about the stem. Its leaves are in whorls of four to six. The stems can be five feet long and trail along the ground or water surface, becoming erect and leafy at the ends. There is a very successful biocontrol agent available parrot's feather; it is a *Lysathia* sp. Beetle. The biological control of this weed takes considerably longer (3-4 years) than the above three species where control can be expected within two years. The beetle is available from the various mass rearing stations in South Africa. No other control methods are necessary for this weed. Refer to map of distribution and existing release sites (Appendix II).



Plate 5. *Myriophyllum aquaticum* (a) looks like a parrots feather and can form dense mats (b).

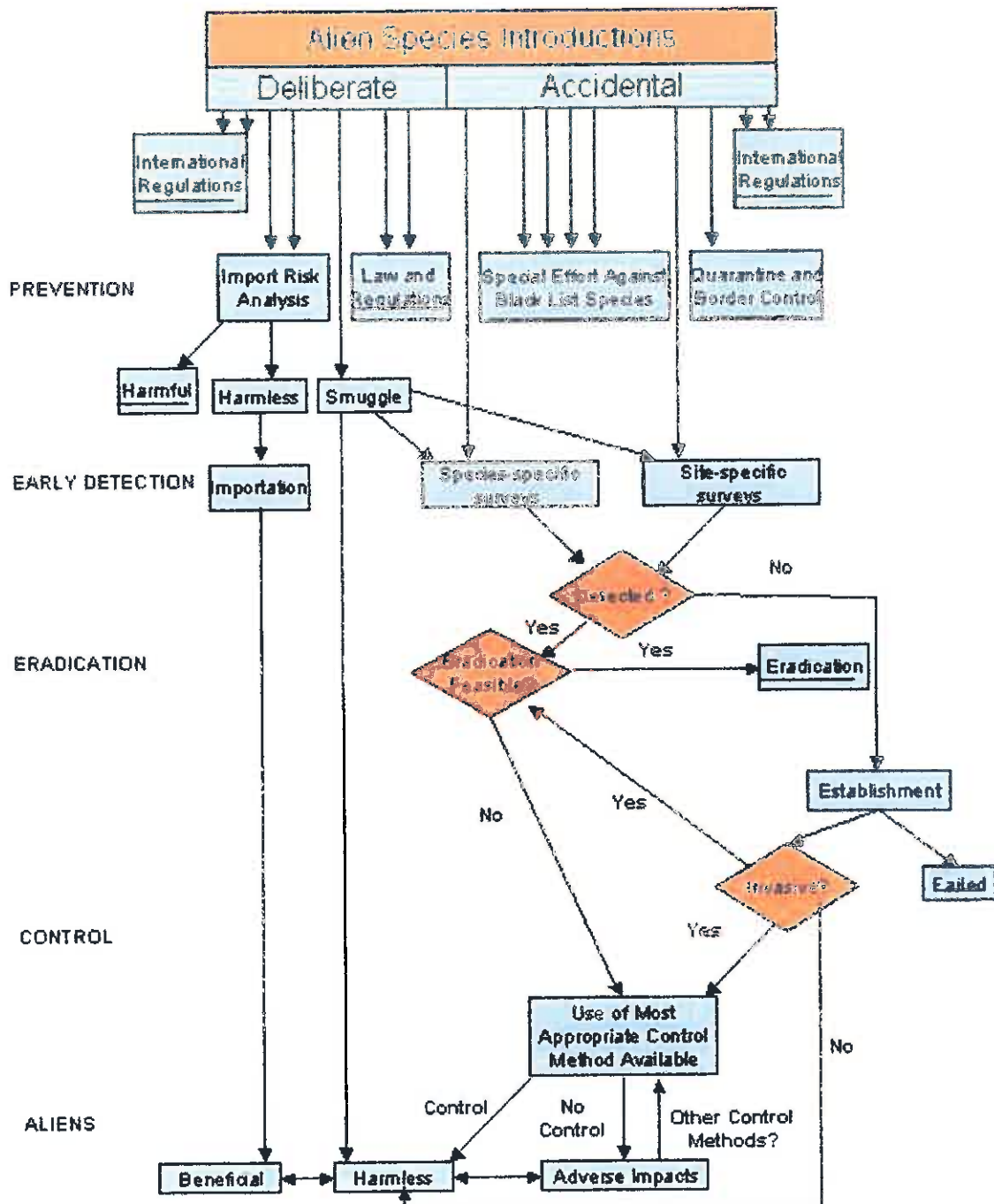


Figure 1. Summary of options to consider when addressing aquatic invasive alien species. Orange diamonds represent decision points.

EMERGING AQUATIC WEEDS

There are some emerging aquatic weeds that are starting to show a potential of becoming aggressive invaders and thus research and monitoring are being done so as to curb their invasive potential. Some examples of these are Duckweed (*Lemna* sp.), Pickerel weed (*Pontederia cordata*), Alligator weed (*Alternanthera philoxeroides*), Spiked water milfoil (*Myriophyllum spicatum*), Hydrilla (*Hydrilla verticillata*) and *Elodea* sp. Monitoring, research and best control options are being developed through the Emerging weeds rapid response strategy. Recently spiked water milfoil has been recorded on the Vaal River and several other systems. This species can often be confused with *Ceratophyllum demersum*. Submerged aquatic species are becoming more abundant; all plants encountered should be collected, pressed in newspaper and sent to SANBI for identification. This is vital if the Early Detection and Rapid Response approach is going to work.



Plate 6 : *Myriophyllum spicatum* close up (a) and a dense mat at Barkly West (b).

Watercress (*Nasturtium officinale*) is a mat forming, rooted aquatic plant with erect, creeping or floating stems up to 1m long. The stems and leaves are soft.

This species was introduced from Europe and cultivated for its edible stems and leaves. It is part of the mustard family and is widely cultivated as a vegetable. This species invades riverbanks and the edges of dams and streams (Henderson and Cilliers, 2002). Watercress grows best in fairly fast flowing, nutrient rich but clear streams or rivers.

This species has become problematic on sections of the Vaal River, Spioenkop dam and several rivers in the KZN Midlands. Currently, this species is not being controlled, but will be controlled chemically once there is a registered herbicide for

watercress. In the meantime, it will be controlled manually. The problem with watercress is that it can clog waterways, reduce waterfowl, compete with indigenous riverbank species and obstruct access to the water's edge. This would then cause problems and interfere with recreational watercraft.



Plate 7 : *Nasturtium officinale* (Watercress) in the Vaal River (a) and close up and flowering (b).

OPPORTUNISTIC SPECIES

Opportunistic species can flourish in disturbed environments, often becoming the dominant species to the detriment of the other species. This group includes indigenous and cosmopolitan (world-wide) species. These species respond to various disturbances and are usually symptomatic of a problem and not the problem itself. The disturbances range from nutrient enrichment through agricultural run off and sewerage contamination to manipulations of river flow and water levels, including destruction of wetland vegetation (Henderson and Cilliers, 2002).

A list of the opportunistic aquatic species is highlighted in Appendix IV with their photographs.

PRIVATE LANDOWNERS

Private landowners have dams on their properties that could pose a threat to the larger bodies of water under DWA control as these dams could harbour invasive aquatic plants. It is essential that private landowners are involved, as they will be engaged to broaden the database and the extent of infestation within the system and highlight the potential of private dams on their property acting as a source of further infestation. Landowners will receive training on the identification of aquatic weeds so

as to be able to identify the aquatic weed present on their dams. A standard landowner agreement is needed and must be signed by the private landowner before any invasive alien plant control work can start on private dams. This will be used as an incentive to private landowners.

It is envisioned that private landowners will be responsible for the containment strategy on Roodeplaat dam. The washing down of all boats entering and exiting the dam.

LEGAL ISSUES

The control of aquatic weeds is governed by 4 sections of legislation, namely; 1) the Conservation of Agricultural resources Act 43 of 1983 (CARA) which identifies the different categorized species, 2) the National Environmental Management Biodiversity Act 1 of 2004 (NEM:BA) that says that all landowners have a responsibility to remove all category 1a and 1b species, 3) the National Water Act 36 of 1998 (NWA) that states that DWS is the custodian for water bodies in this country and that the control methods that maximize water gain/production will be used and 4) the Environment Conservation Act 73 of 1989.

AQUATIC WEED INFESTATIONS

DEA NRM has compiled a database of the aquatic weed infestations and the control methods for each management unit on Roodeplaat dam (Table 3). This database forms the basis for this strategic plan. New information can be incorporated into this database to provide an overall picture of the aquatic weed infestation in the system.

CONTROL OPTIONS

There are four direct control options available for use in this strategy, namely; chemical, mechanical, manual (harvesting) and biocontrol (Table 2). Hydrological strategies are important, water quality improvement needs to be addressed. Biocontrol can be used widely in small dams and rivers that are not major water supply dams. There should be a zero tolerance on all dams which are potable water supply dams, and thus the aquatic weeds here will be controlled chemically by either aerial spraying or from boats and from the shore. Manual methods can be used on some systems elsewhere in an integrated approach and in areas where subsistence use is to be trialled. Harvesting management units were considered but it was

decided that this would not be feasible on this dam however, manual removal in winter will be incorporated. These control options will be integrated per management unit.

There are some management units on the system that will be sprayed from the shore and boats by trained personnel. However, some sites are either inaccessible or dangerous for ground teams and thus these sites will be aerially sprayed, or as a last resort.

Manual removal and mechanical control

Manual removal through hand pulling or using pitch forks is used in a number of developing countries such as South Africa and China. This method is very labour intensive, only effective for small infestations and essentially used as an employment creation exercise. Zimbabwe initiated a manual removal programme on Lake Chivero, in the early 1980s (Chikwenhere and Phiri 1999). Mechanical control has also been implemented around Port Bell and Owen Falls Dam on Lake Victoria with limited success (Mailu, 2001) and on the Liwonde Barrage in Malawi. Furthermore, the remoteness of many infestations makes mechanical control unfeasible. Booms and cables have been used to prevent water hyacinth from entering water abstraction pumps and hydro-power coolant intakes. Further, cables have been used to allow the weed to build up behind them, making herbicide applications more efficient (Jones 2001). Management unit 6 was trialled as a harvesting area, however, this turned out not to be feasible or supported by the stakeholders around the dam.

Integrated control

Despite biological control having been highly successful in some regions of the world, in others (e.g. the temperate areas of southern Africa, the USA and China) acceptable levels of control have not been achieved through this method, or biological control is perceived to be too slow acting. In these regions the emphasis has shifted from a purely biological to a more integrated management approach, which includes aspects of biological control, herbicide applications, manual removal and possibly most importantly, the management of nutrients entering the aquatic ecosystem (Hill and Olckers 2001). Jones and Cilliers (1999) and Jones (2001) developed an integrated management programme for the Nseleni River system in the

more tropical region of South Africa. The key elements of this approach were primarily the appointment of a champion to drive the control programme, the involvement of all interested and affected parties on the river system, the division of the river system into management units and the implementation of appropriate control methods for each of these management units. Using this integrated approach, some 19km of river that was previously 100% covered by water hyacinth was initially cleared using mainly herbicide application and is maintained at 5% weed cover through biological control with occasional follow-up herbicide application around sensitive sites (water abstraction localities) when necessary. The time scale for this control operation was between 1995 and 2000 (Jones 2001) and represents an example where a river has been returned from being heavily impacted by water hyacinth to a fully functioning aquatic ecosystem through appropriate management. An integrated management plan for water hyacinth could be summarised under the broad points highlighted in figure 2.

Natural manipulations of Roodeplaat dam can also be used to the benefit of the control programme. The floods can be used to bank the water hyacinth up against the cables where the chemical control can then be done. This can only be used in mild floods. The manager will then be in a position to be ready to be able to handle the situation. This would also reduce any safety risks of any teams currently working on the system that might be caught unaware of the approaching waters.

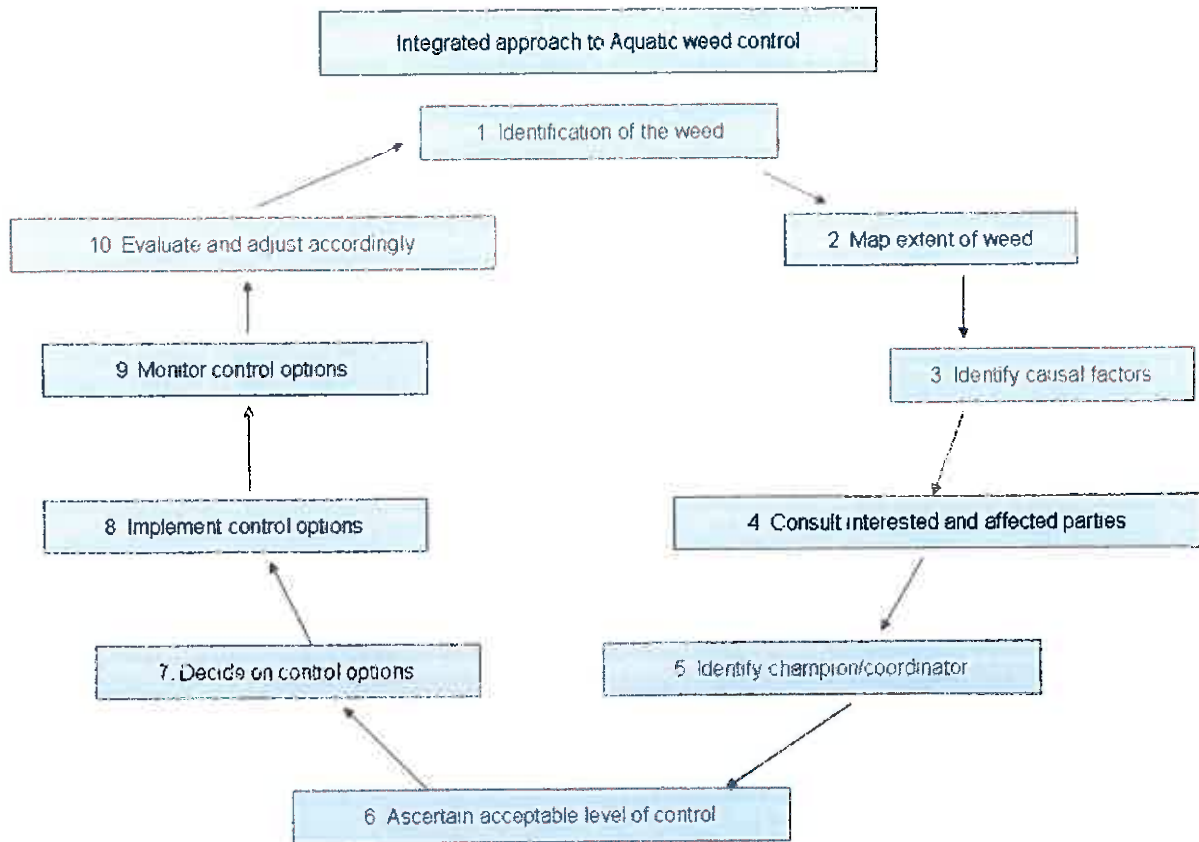


Figure 2. Flowchart highlighting the control process to aquatic weed control

Biocontrol

The biocontrol agents are the most active in the summer months and releases of these agents would take place from September-March. Additional seasonal workers will be employed during this period to help with the rearing of the biocontrol agents. Refer to the action table for the proposed aquatic weeds programme. The sites will only be monitored once the releases have taken place and this would be at the end of the current financial year, stretching into the next financial year. The section below the dam wall will be demarcated as a biocontrol reserve.

Table 2. The action table for the aquatic weed biocontrol programme

Action	Person/Organisation responsible	Time *
Purchase of materials for rearing		October – pending approval
Set up materials		October onwards
Mass rear aquatic weed agents		October onwards
Manage nursery site		October onwards
Distribute site selection criteria forms to interested persons (Appendix III)		October onwards
Release aquatic weed agents		October – March
Identify release sites		June-August
Monitor release sites		February - April

Monitoring

DWS is responsible for the water systems and monitoring thereof in this province, excluding private systems and thus monitoring of water quality and infestation levels is the responsibility of DWS. The Aquatic weeds project officer will monitor all sites on the dam. The biocontrol sites will be the responsibility of the Biocontrol Officer in the WMA, where applicable. This decision will be at the discretion of the WMA. PPRI is engaged to monitor and assist in the technical biocontrol implementation as well as provide advice and research on other control options.

Water monitoring

The monitoring of the water quality on the dam will be the responsibility of the DWS water quality section. The data collected will be made available to the committee on the dam to peruse.

Strategic Plan for the Integrated Control of Aquatic weeds – Roodeplaat dam

Table 3. The aquatic weed sites on Roodeplaat dam to be controlled

WMA	MU no.	Description	Grid Reference	Submerged aquatic weed species	Emerged Aquatic weed species	Control method	Other points	Comments	Priority	Score	Approximate area (in Ha)
3	3.1	Motor boat section		None yet	Water hyacinth	Aerial and boat spraying	Access points	Aerial applications and spraying from boats and shore	4	5	146 ha
	3.2	Rowing section		None yet	Water hyacinth	Aerial and boat spraying	Access points	Aerial applications and spraying from boats and shore Fishing from shore	5	4	111 ha
	3.3	Fishing section including Molenaarspuit and Plenaars rivers		None yet	Water hyacinth	Boat spraying	Fishing access points	Aerial application if necessary , boat spraying	4	5	34 ha
	3.4	WWTW and stream		None yet	Water hyacinth	Boat spraying	Fishing access points	Aerial application if necessary , boat spraying	3	1	14 ha
	3.5	Bay near dam wall		None yet	Water hyacinth	Harvesting	Access point for harvester	Manual removal by Invader Destroyers	2	3	6 ha
	3.6	River section from the dam wall		None yet	Water hyacinth	Biocontrol reserve		Biocontrol reserve for a back up for Roodeplaat dam	3	5	4 ha
	3.7	All off flow bays		None yet	Water hyacinth	Boat spraying		Consider harvesting in winter	1	3	52 ha

Priority is rated from 1-5 with 5 being the highest. The score is a measure of infestation levels with 5 being the highest and 0 being not present.

FINANCE

The funding for Roodeplaat dam will be sourced from WMA 3 the trading account.

PUBLIC AWARENESS

Public awareness programmes will be started to target private landowners affected by aquatic weed infestations and encourage their participation in implementing an integrated control strategy through various means. This is

- i) Supplementary in local newspapers highlighting the aquatic weeds found on Roodeplaat dam
- ii) Posters and leaflets (obtainable from WfW) displayed in DWS water quality, DAFF extension officers and nurseries etc.

OPPORTUNISTIC SPECIES

Opportunistic aquatic plants can flourish in biologically disturbed aquatic environments, often becoming the dominant plants to the detriment of other aquatic species (Glen *et al.*, 1999). This group includes many indigenous and cosmopolitan (worldwide) species (Henderson and Cilliers, 2002). Refer to Appendix IV for a list of these species.

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**APPENDIX I. THE TERMS OF REFERENCE FOR THE ROODEPLAAT
DAM ADVISORY COMMITTEE**

Terms of Reference for the Roodeplaat Dam Advisory Committee

The Roodeplaat dam Committee may include:

- Chairperson –
- Secretary –
- Budget controller –
- Communication –
- Co-ordinator –
- Private landowners
- Aquatic weeds Project officer
- Water quality representative
- Dept. Public Works
- DAFF representative –
- National Aquatic Weeds Co-ordinator

- Other Partners / stakeholders to be represented
- DD's when necessary

Venue: Roodeplaat dam – Public Works boardroom

The role of the RDAC is to implement an integrated control strategy through:

- Formalized liaison between roleplayers
- Facilitating integrated strategy development
- Coordinating the implementation of control tools
- Prioritizing activities
- Identifying workload and required resources
- Evaluating achievements of control methods against key performance areas
- Facilitating technical information flow
- Addressing reporting requirements
- Addressing training requirements

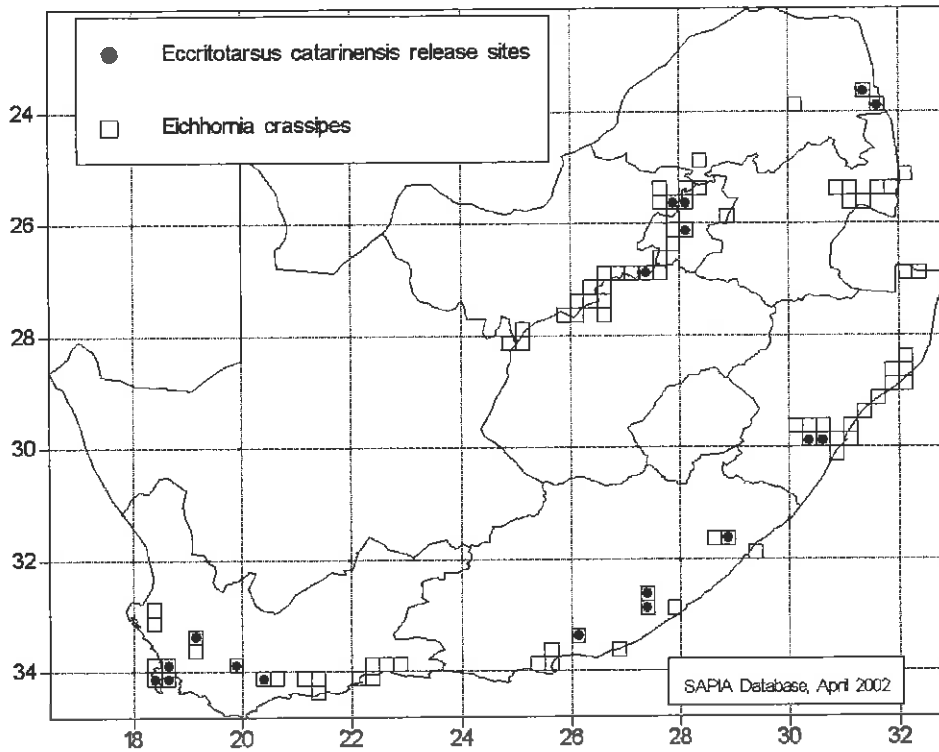
Strategic Plan for the Integrated Control of Aquatic weeds – Roodeplaat dam

- Furthering the programme through awareness and cooperation
- Communicating the objectives of DEA NRM, DWS and other stakeholders to achieve a broad benefit
- Ensure that control implementation complies with statutory legal requirements

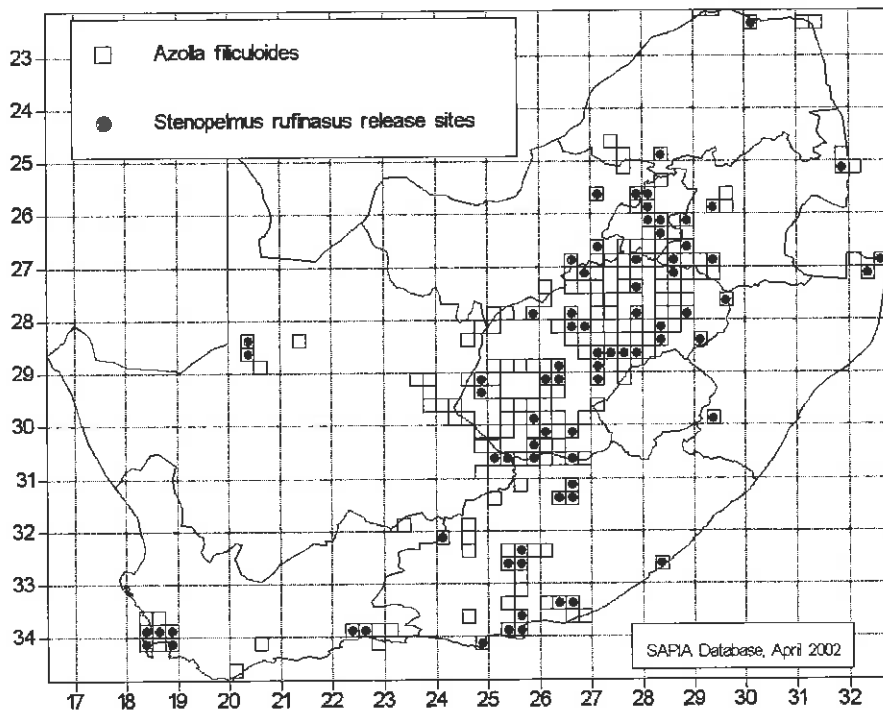
It is envisaged that the RDAC will meet more frequently initially, during the transition, with a view to quarterly meetings. The members will be chosen by the meeting.

APPENDIX II. THE MAP OF DISTRIBUTION AND EXISTING RELEASE SITES

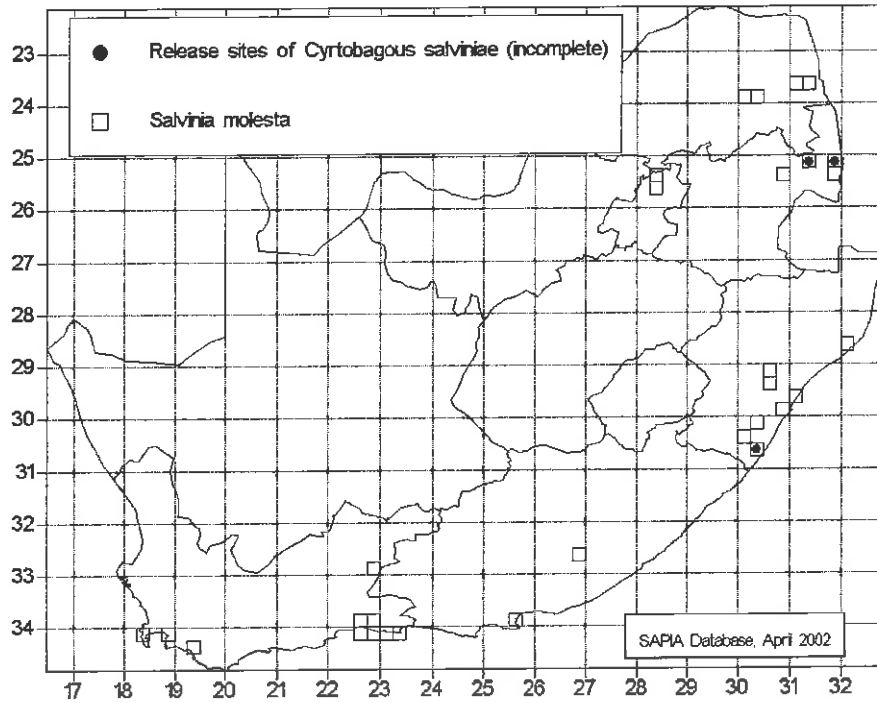
***Eichhornia crassipes* (water hyacinth)**



***Azolla filiculoides* (red water fern)**



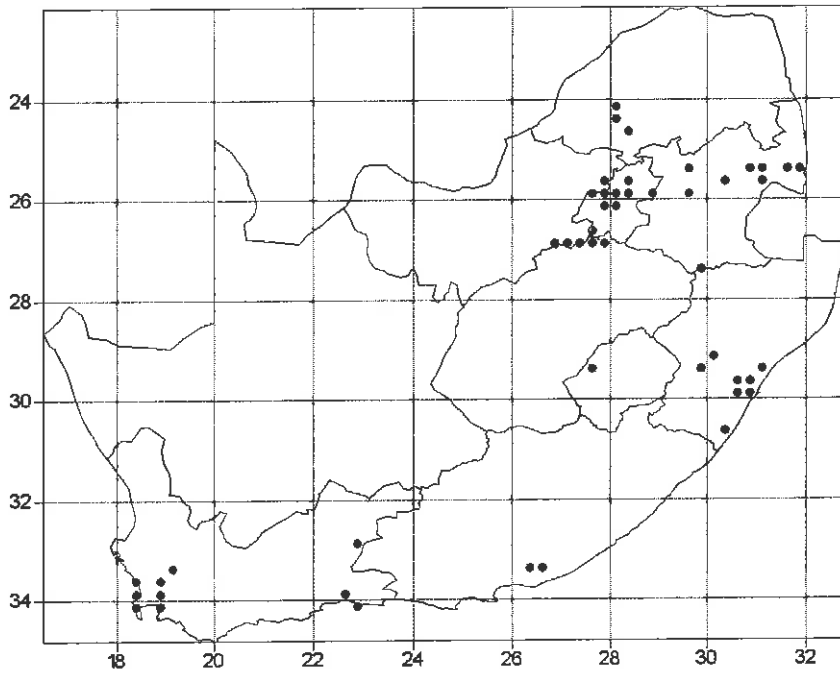
***Salvinia molesta* (Kariba weed)**



***Pistia stratiotes* (water lettuce)**

Not available

***Myriophyllum aquaticum* (Parrots feather)**



APPENDIX III. SITE SELECTION CRITERIA FORMS FOR BIOCONTROL AGENTS

Strategic Plan for the Integrated Control of Aquatic weeds – Roodeplaat dam

Date: _____ Site Selection Criteria Record Number.....(Official use only)

Site Selection Criteria for biological control agents (*Working for Water* Programme (WfW))

Details of interested person

Name (Mr/Ms)	
District / Farm/ Reserve name	
Province	
Nearest town	
Physical address	
Actual position of site	
Latitude (°S)(of site)	Longitude (°E)(of site)
Telephone number	Fax number
Organisation (conservancy, farming community , FS Wildlife)	E-mail address

Land type/use (Tick appropriate box)

1. State land		2. Private land		3. Municipal land	
Reserve		Reserve		Reserve	
Forestry		Forestry		Suburban	
Tribal		Grazing		Open plot	
Other (eg. Farm)		Crop/ Orchard		Park	

Habitat of site (Tick appropriate box(es))

1. Aspect of slope		5. Road type (to the site)		7. Do the plants touch each other?	
Direction – N		Tar		Yes	No
S		Gravel		8. Is the site accessible? If yes, give distance from road	
E		Dirt		Yes	No
W		Loose sand		Distance	
2. Incline of slope		6. Shade type		9. Is the site prone to getting much dust?	
Steep >20%		None		Yes	No
Gentle < 20%		Full shade (under canopy)		10. Is the site protected from fire and/or other disturbance?	
3. Does the site get frost?		Half shade (under canopy)		Yes	No
Yes	No	<30% shade		11. Is the site likely to be cleared in future (within 5 years)?	
4. Road type (at the site)		7. Area of site		Yes	No
Tar		<10m		If so, when	
Gravel		>10m<100m		12. Who is responsible for conserving the site? (give name)	
Dirt		<100m<1 ha			
Loose sand		> 1ha			

Alien Plant History (Tick appropriate box(es))

1. Do you have a clearing programme?		4. If no, is there another party involved? Name them			
Yes	No				
2. If yes, state the type		5. Target aliens			
Manual clearing		Bugweed		Pereskia	
Herbicide		Lantana		Water hyacinth	
Both		Chromolaena		Kariba weed	
3. Is WfW involved?		Mauritius thorn		Other (name)	

Strategic Plan for the Integrated Control of Aquatic weeds – Roodeplaat dam

Yes		No		Black wattle		
-----	--	----	--	--------------	--	--

Biocontrol History (Tick the appropriate box(es)) Fill in one table per alien plant

1. Why has the proposed site been selected for biocontrol?			4. Name of agent and plant			
			Plant		Agent	
			5. When was the BC agent released? (Give date)			
2. Any existing BC releases on your land?			6. Did the BC agent establish?			
Yes		No		Yes		No
3. Proximity to nearest release from this site (in km)						

E.2

1. Why has the proposed site been selected for biocontrol?			4. Name of agent and plant			
			Plant		Agent	
			5. When was the BC agent released? (Give date)			
2. Any existing BC releases on your land?			6. Did the BC agent establish?			
Yes		No		Yes		No
3. Proximity to nearest release from from this site (in km)						

E.3

1. Why has the proposed site been selected for biocontrol?			4. Name of agent and plant			
			Plant		Agent	
			5. When was the BC agent released? (Give date)			
2. Any existing BC releases on your land?			6. Did the BC agent establish?			
Yes		No		Yes		No
3. Proximity to nearest release from from this site (in km)						

E.4

1. Why has the proposed site been selected for biocontrol?			4. Name of agent and plant			
			Plant		Agent	
			5. When was the BC agent released? (Give date)			
2. Any existing BC releases on your land?			6. Did the BC agent establish?			
Yes		No		Yes		No
3. Proximity to nearest release from from this site (in km)						

E.5

1. Why has the proposed site been selected for biocontrol?			4. Name of agent and plant			
			Plant		Agent	
			5. When was the BC agent released? (Give date)			
2. Any existing BC releases on your land?			6. Did the BC agent establish?			
Yes		No		Yes		No
3. Proximity to nearest release from from this site (in km)						

Contributors:WfW (Debbie Muir), PPRI (T. Olckers and C. Zachariades) and sappi (W. Lotter)

Please return copies of this sheet (post or fax) to Debbie Muir, WfW Programme, C/o ARC – PPRI, Private bag X6006, Hilton, 3245. Fax (033) 3559423 Cell: 082 462 1584

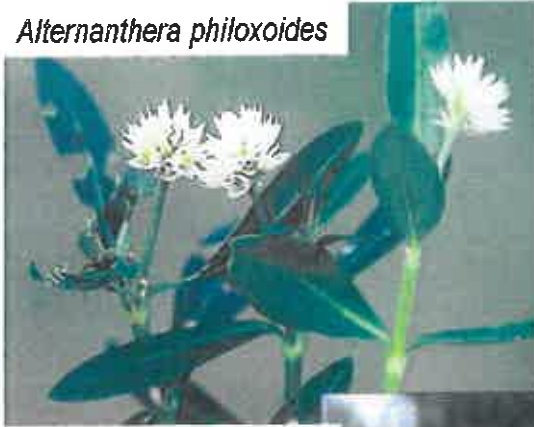
APPENDIX IV: LIST OF OPPORTUNISTIC AQUATIC PLANTS

Table 4. List of Opportunistic aquatic plants

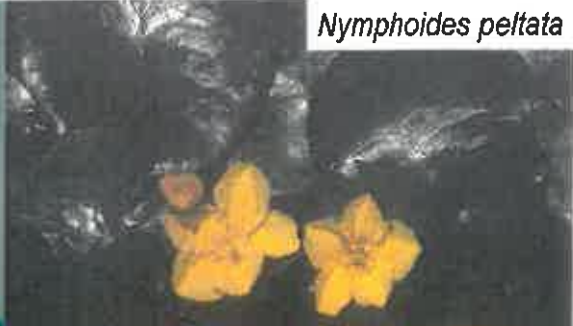
Common Name	Scientific name
Fennel-leaved pondweed	<i>Potamogeton pectinatus</i>
Saw-weed	<i>Najas horrida</i>
Water hornwort	<i>Ceratophyllum demersum</i>
Coarse oxygen weed	<i>Lagarosiphon major</i>
Fine oxygen weed	<i>Lagarosiphon muscoides</i>
Willow-herb	<i>Lugwigia stolonifera</i>
'Blue' water lily	<i>Nymphaea nouchali</i>
Floating heart	<i>Nymphoides thunbergiana</i>
Bulrush	<i>Typha capensis</i>
Water pennywort	<i>Hydrocotyle bonariensis</i>



Alternanthera philoxoides



Nymphoides peltata



Ceratophyllum demersum



Potamogeton pectinatus



Pontederia cordata



Persicaria amphibia

MEMORANDUM OF AGREEMENT

ENTERED INTO BY AND BETWEEN

DEPARTMENT OF WATER AND SANITATION

(Hereinafter referred to as "DWS")

Herein represented by

MS MARGARET-ANN DIEDRICKS

In her capacity as accounting officer and duly authorised hereto by virtue of the
Public Finance Management Act, 1999 (Act 1 of 1999)

AND

THE DEPARTMENT OF ENVIRONMENTAL AFFAIRS

(Hereinafter referred to as "DEA")

Herein represented by

MS NOSIPHO NGCABA

In her capacity as accounting officer and duly authorised hereto by virtue of the
Public Finance Management Act, 1999 (Act 1 of 1999)



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2. PREAMBLE

2.1 DWS would like to ensure the implementation of water resource management functions related to watershed services, as per the water resources and pricing strategies. These include the control of waterweeds and terrestrial invasive alien plants, the restoration of degraded landscapes that impact on siltation, and wetlands to improve water quality and regulation. In addition they seek to address unlawful afforestation. DEA, through the Natural Resource Management Programmes, is working with Conservation Agencies, DAFF, DWS and CoGTA, to establish an integrated natural resource management programme in South Africa. The suite of Natural Resources Management Programmes, spearheaded by the Working for Water Programme, ensures that South Africa addresses its responsibilities relating to the management of natural resources, whilst ensuring that meaningful livelihood opportunities are supported for those employed in these Programmes. Seven key sub-programmes can be discerned at present as follows :-

2.1.1 Working for Water

The purpose of this sub-programme is to manage invasive alien species in order to enhance the sustainable use and conservation of our natural resources and support the integrity of South Africa's natural resource capital.

2.1.2 Working for Wetlands

The purpose of this programme is to champion the protection, rehabilitation and sustainable use of South Africa's wetlands through co-operative governance and partnerships.

2.1.3 Working for Rivers

Working for Rivers Programme aims to piece together in a sustainable manner the objectives of aquatic ecosystem health, economic growth, human health and co-dependent land and water use principles. Human behavior lies at the hub of most, if not all, of these aspects and will be treated as the key success factor in the sustainability of the programme. It is necessary to create awareness among South Africans on the importance of caring for the scarce water resources and to actively participate in the protection and management thereof.

2.1.4 Working on Fire



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The purpose of this programme is to enhance the sustainability and protection of life, livelihoods, ecosystem services and natural processes through integrated fire management, in order to contribute to economic empowerment, skills development, social equity and accelerated service delivery.

2.1.5 Working for Ecosystems - (Watershed Management)

The purpose of this programme is to prevent, where possible the negative impact of land degradation process on ecosystem services important for the protection of biodiversity and food security. Where land is already degraded, this programme will manage the restoration of degraded land for carbon sequestration (linked to climate change considerations), ecological and sustainable harvesting benefits, including addressing erosion and the impact this has on water security/watershed services and the productive potential of agricultural and conservation land, with its nature based recreation and tourism potential.

2.1.6 Working for Forests

The purpose of this programme is for the sustainable development and management of new afforestation by transforming invading alien plant stands into utilizable resources for both commercial production and the use by neighbouring communities in a manner that will maximize the socio-economic benefits, ensure the sustainable use and maintenance of natural areas and minimize the risk of alien plant invasions. DEA will work with DWS to ensure that Stream Flow Reduction Activity (SFRA) Licenses are issued when needed.

2.1.7 Value Added Industries

2.1.7.1 Eco-furniture (EF) Programmes

The EF programme seeks to make optimal use of the biomass cleared through the Working for Water programme, in creating work opportunities to make products that help Government to meet its needs, and champion the pro-poor opportunities within this. The initial focus of the production centres around factories that will be established across the country (because of the need to spread out the employment benefits, the availability of biomass, and transportation costs), with a particular emphasis on the needs of disadvantaged schools, by manufacturing school desks, benches and other furnitures. The programme will build on the



range of products that are possible, such as meeting the needs of hospitals, clinics, community centres, etc, and including the provision of the established Eco-coffins across the country.

2.1.7.2 Working for Energy (WfE) (Biomass to Energy)

The WfE (Biomass) programme seeks to make optimal use of the biomass cleared through the Working for Water programme in creating work opportunities to generate energy. The programme will also promote the general use of biomass through biogas digesters, in providing energy and jobs to the rural poor.

- 2.2 These Programmes also have an overarching objective, to improve livelihoods of beneficiaries through:-
- 2.2.1 enhancing the financial capital of beneficiaries by developing sustainable SMMEs providing decent job opportunities to beneficiaries;
 - 2.2.2 enhancing the Human Capital of beneficiaries by supporting a safe and healthy work environment and providing skills and education programmes to beneficiaries; and
 - 2.2.3 enhancing the social capital of beneficiaries by supporting the establishment of accessible and effective governance and local support systems.
- 2.3 The programme is implemented following a labour-intensive approach and integrating operations with social-development initiatives.
- 2.4 In the spirit of section 41(1) (h) (i), (ii) and (iii) of the Constitution of the Republic of South Africa, the DWS and the DEA have agreed to collaborate in the implementation of Natural Resource Management Programmes projects in priority catchments and land under the control of the DWS and to provide work and training for beneficiaries under DEA's NRM programmes.
- 2.5 The DWS is desirous of having Natural Resource Management programmes implementing **Compliance Monitoring and Enforcement** Projects with respect to the eradication of unlawful afforestation. These projects will be managed by the DEA and the DWS in accordance with annexure B: Standard Operating Procedures and the relevant regulations of the National Water Act, National Environmental Management and Biodiversity Act, National Environmental Management Act and the Conservation of Agricultural Resources Act.



WHEREAS, the DWS is desirous of having Natural Resource Management Programmes (NRM) to be managed by the DEA in priority catchments and state land under its control;

AND WHEREAS, the DWS and the DEA have agreed to collaborate in the implementation of the NRM projects;

AND WHEREAS, the DWS and the DEA have agreed to make use of the services and expertise of the NRM programmes to fulfil the above objective of improving watershed services.

AND WHEREAS, the DWS and the DEA have agreed to share resources related to the implementation of the NRM programmes in order to optimize government investment.

NOW THEREFORE THE PARTIES AGREE AS FOLLOWS:-

3. DEFINITIONS AND INTERPRETATION

3.1 In this Agreement, unless the contrary appears from the context, the following words and phrases shall have the meanings ascribed to them:-

3.1.1 **"Agreement"** means this Agreement together with all the annexures thereto;

3.1.2 **"BOPs"** means Best Operating Standards;

3.1.2 **"DEA"** means the Department of Environmental Affairs;

3.1.3 **"DWS"** means the Department of Water & Sanitation;

3.1.4 **"Implementing Agent"** means the management authority responsible for the day to day supervision and running of projects in partnership with the NRM programmes.

3.1.5 **"NRM"** means the Natural Resources Management;

3.1.6 **"Parties"** means the DWS and the DEA collectively and **"Party"** refers to either one of them as determined by the context;

3.1.7 **"PMC"** means the Project Management Committee;



3.1.8 "the **Remuneration**" means the amount payable by the DWS to the DEA for the Services;

3.1.9 "the **Services**" mean the Services to be rendered by the DEA in terms of this Agreement;

3.1.10 **SFRA**" means Stream Flow Reduction Activity;

3.1.11 "**WfW**" means Working for Water;

3.2 In this Agreement :-

3.2.1 unless otherwise indicated, any meaning ascribed to a word, phrase or expression in this Agreement, shall bear the same meaning wherever it appears thereafter;

3.2.2 headings to the clauses in this Agreement are only for convenience and reference only and shall not be used in the interpretation of this Agreement.

3.3 This Agreement shall bind the Parties and their respective successors-in-title.

4. **SCOPE OF AGREEMENT**

4.1 **Partnership**

4.1.1 The Parties hereby enter into a partnership to establish, train and deploy natural resource management resources in strategic catchments and state land under the control of the DEA in order to enhance watershed services.

4.1.2 The total capacity to be deployed would be agreed upon on an annual basis between the DWS and the DEA. The DWS will act as partner and do compliance management of the NRM projects in strategic catchments and state land under the control of DWS in order to enhance watershed services.

4.1.3 Development of a DWS/DEA Project Steering Committee to meet on an annual basis or as required to discuss progress on the implementation of the MOA.

4.2 **Working for Water Services**

The DEA agrees to implement projects focusing on the improvement of the following watershed services and outcomes are as follows:

4.2.1 **Improve Flows**

4.2.1.1 Decrease Flood/high flows;

4.2.1.2 Improve Low Flows;

4.2.1.3 Improve yield from existing and new water infrastructure; and

4.2.1.4 Improve the Ecological Reserve, through the restoration and improvement of land management practices and the control of invasive alien plants.

4.2.2 Minimize Sediments

4.2.2.1 Minimize siltation of rivers, dams and other infrastructure through restoration, improvement of land management practices and the control of invasive alien plants.

4.2.3 Optimize Water quality

4.2.3.1 Optimizing water quality to minimize purification costs;

4.2.3.2 Minimize waterweeds, and

4.2.3.3 Optimize water quality in areas where water is extracted from rivers in order to minimize health risks through restoration, improvement of land management practices and the control of invasive alien plants.

4.2.4 Address unlawful afforestation

Where a person has contravened any provisions of the National Water Act, and the DWS has issued a directive in terms of Section 53 Directives to rectify such contraventions, such directive allows the transgressor to take any action specified in the directive to rectify the contravention within a specified time. Where the water user fails to adhere to the requirements of the directive, Section 53(2) allows the DWS to carry out any works and take any other action necessary to rectify the contravention and to recover its reasonable costs from the person on whom the directive was issued.

The DWS and the DEA will ensure that directives issued to Stream Flow Reduction Activity transgressors are implemented to protect the water resources and other water users. Addressing unlawful afforestation will release water to the system for fair allocation, the implementation of the Reserve and the protection of lawful water users.

4.2.5 Through partnerships with the private sector and relevant land use sectors, unlock resources for the restoration of ecological infrastructure and watershed services in order to enhance the investments made by the DEA's Natural Resource Management Programmes, for the protection of water resources in line with the requirements of the National Water Act.



Through DEA's Land User Incentive programmes engage with the relevant land use sectors, including: the sugar and forestry industries, agriculture in general and traditional authorities.

5. COMMENCEMENT AND DURATION PERIOD

The Agreement shall commence, notwithstanding the date of signature of this Agreement, on 1 April 2015 and terminate on 31 March 2018, with the option of an extension if the Parties are satisfied with the performance of the projects/services and upon mutual agreement between both Parties on such terms as the Parties may then agree to in writing.

6. RESPONSIBILITIES OF THE PARTIES

6.1 The DWS shall, *inter alia*:

6.1.1 Fund the project in accordance with Clause 7;

6.1.2 Funding from the DWS will specifically cover the services rendered on behalf of the DWS and it shall not be used to acquire any assets;

6.1.3 Chair and keep minutes of the Project Steering Committee (PSC) meetings where agreed upon;

6.1.4 Conduct regular site visits to monitor progress on the project and to ensure compliance with the best operating procedures as needed;

6.1.5 The execution of any work shall be in accordance with the Standard Operating Procedure, which be agreed to by the Parties on an annually for the duration of this Agreement; and

6.1.6 Reserve the right to consult and appoint any Professional Service Provider to execute the work should the DEA fail to comply with the terms and conditions of the Annexure B.

6.2 The DEA shall, *inter alia*:

6.2.1 Implement the projects through its NRM programme as per the Annual Plan of Operations (APO), per project, agreed upon annually basis and signed off by the authorised representatives of the Parties;;

- 6.2.2 Field fully trained NRM certified workers and staff, as per NRM Best Operating Procedures (BOPs);
- 6.2.3 Equip the projects with the correct personnel, appropriately trained workers and operational and protective equipment as per NRM BOPs;
- 6.2.4 Ensure the replacement of badly worn out and broken equipment / tools due to reasonable wear and tear;
- 6.2.5 Follow proper policies and procedures in line with PFMA and the DEA policy frame work on the acquisition, maintenance, safeguarding and disposal of assets and ensure that contingency arrangements are made available for the projects;
- 6.2.6 Ensure the provision of road worthy and licensed vehicles when NRM vehicles are being utilised;
- 6.2.7 Use licensed drivers when NRM vehicles are being utilised;
- 6.2.8 Supply project officers with 6 (six) or more clearing or restoration teams deployed for NRM operations;
- 6.2.9 Operate within the NRM - BOP's when rendering the requested services;
- 6.2.10 Operate under the authority of a suitably qualified and/or experienced NRM person as agreed between the DEA and the DWS;
- 6.2.11 Ensure that all requests for the NRM resources for the DWS projects are routed through the NRM channels for approval;
- 6.2.12 Jointly with the DWS investigate all incidents and accidents; and
- 6.2.13 Carry out inspections to monitor progress on the project and to ensure compliance with the Agreement.

7. REMUNERATION

- 7.1 The financial contribution from the DWS will be agreed upon by the Parties on an annual basis, and prior to the start of the financial year. These will include costs and fees and any other disbursements to the DEA for the services to be rendered under NRM during the relevant financial year. The DWS



contribution is only limited to fees and will not cover payment made for acquisition of assets.

- 7.2. The DEA shall submit claims to the DWS on the work that has been agreed upon and duly executed.. The claim shall be accompanied by relevant deliverables signed by the relevant delegated official. The claim shall include cost breakdown per Water Management Area and the DWS undertake to reimburse the DEA for services rendered.
- 7.3 The DEA shall provide progress reports, as per agreed schedule and timeframes between the DWS and the DEA on services rendered at the end of each quarter. Each Party shall be expected to keep proper records for audits and inspections purposes.
- 7.4 In the event that the project cost exceed the allocated amount as per Clause 7.1 above, the DEA shall notify the DWS in writing and within reasonable time of the additional amount. The additional amount shall be allowed in exceptional circumstances only. The DWS shall respond to the DEA on its ability to assist with additional funding within reasonable time.
- 7.5 The DEA shall submit claims on the work already executed to the DWS Provincial Heads or Project Managers or Executive Offices of the CMAs as the case may be

8. PROJECT MANAGEMENT COMMITTEE

- 8.1 A Project Management Committee (PMC) constituting of representatives from the DWS and the DEA shall be established upon signature of this Agreement and shall function on an on-going basis for the duration of this Agreement.
- 8.2 The functions of the PMC shall, *inter alia*, include:
 - 8.2.1 The development, on an annual basis, an Annual Plan of Operation, per project and sign-off by the delegated officials of the Parties;
 - 8.2.2 Managing and facilitating co-operation and consultation in respect of matters dealt with by each Party in terms of this Agreement;
 - 8.2.3 Draft annual plan of operations and related budget in respect to the next financial year for the DWS management review and approval;
 - 8.2.4 Proposing any amendments or supplements to this Agreement and/or Annexure "A" hereto that may be necessary from time to time;



8.2.5 Providing management advice to the Parties;

8.2.6 Identifying and utilising such mechanisms as are deemed necessary for the implementation of this Agreement; and

8.2.7 Providing monthly financial and operational reporting to the Parties.

9. INDEPENDENCE

The Parties have no authority to act on behalf of or bind each other. They will consult each other on every decision affecting collaboration under the Agreement.

10. CONFIDENTIALITY

10.1 Any Party shall treat information furnished by the other Party for purposes of the execution of this Agreement, as confidential.

10.2 Subject to this clause, the Party so furnished with information shall not disclose such information to another person without the prior written consent of the other Party and shall take all reasonable steps to ensure that such information is not disclosed to another person.

10.3 The Parties agree that this Agreement is not intended to restrict use or disclosure of any portion of such information which:

- a) is made known to the public through no default by the receiving Party of its obligations under this Agreement;
- b) is rightfully received by the Receiving Party from a third party having no obligation of confidentiality to the Disclosing Party;
- c) is independently developed by the Receiving Party by persons who did not have access to Confidential Information of the Disclosing Party; or

d) is disclosed by the Receiving Party after receipt of written permission from the disclosing Party.

10.4 The provisions of this clause will survive the termination of this Agreement.

11. INDEMNITY

11.1 The Parties indemnify each other and hold harmless the other against any and all liabilities arising from any acts and/or omissions of the other Party and/or any of either's employees, agents, members and/or appointed officials arising out of this Agreement.

12. SERVICE CONDITIONS

12.1 The Parties shall not be obliged to directly contribute to any pension fund, medical aid or unemployment insurance fund on behalf of each other, its employees or agents.

12.2 The Parties shall faithfully and diligently devote time to the project in terms of this Agreement.

12.3 All work performed as a result of this Agreement shall be of a high standard.

13. SETTLEMENT OF DISPUTES

13.1 Should any disputes and/or differences of opinion arise between the Parties regarding the interpretation of any or all of the provisions of this Agreement during the term of or on the termination thereof that cannot be amicably settled, the aggrieved Party shall forthwith give the other Party 14 (fourteen) days written notice of their dispute and/or difference of opinion.

13.2 After notice in terms of Clause 13.1 above disputes and/or differences of opinion shall be resolved by the PMC.

13.3 Should the matter not be resolved through the PMC then the dispute shall be escalated to the Directors-General of the DWS and the DEA for resolution.

13.4 Where the two Directors-General cannot resolve the dispute, such dispute should be referred to the Ministers of Water and Sanitation and Environmental Affairs who shall attempt to resolve it, and the determination of the Ministers shall be final and binding on the Parties.

14. DOMICILIUM AND NOTICES

14.1 Notices in terms of this Agreement must be in writing and will take effect from receipt at the stated *domicilium* address of each Party. Such notices may be given by registered mail, by hand against written confirmation of receipt or by facsimile.

14.1.1 Notices posted by registered post shall be deemed to have been received by the addressee on the 7th (seventh) business day after posting;

14.1.2 Notices delivered by hand shall be deemed to have been received by the addressee on the day of such delivery; and

14.1.3 Notices transmitted by facsimile shall be deemed to have been received by the addressee on the same day of such transmission and within business hours.


14.2 During the currency of this Agreement, the Parties shall notify each other of any change of address and supply the latter with such new address.

14.3 The DEA chooses the following address as *domicilium citandi et executandi* and for the purpose of serving any notice or any other correspondence in terms of this Agreement: _

Address: The Director-General
The Department of Environmental Affairs
Environment House
Cnr Steve Biko & Soutpansberg Road
PRETORIA
0001
Facsimile: (012) 3593646

14.4 The DWS chooses the following address as *domicilium citandi et executandi* and for the purpose of serving any notice or any other correspondence in terms of this Agreement:

Address: Director General
The Department of Water and Sanitation
10th Floor, Sedibeng Building
185 Francis Baard Street
PRETORIA
0001
Facsimile: (012) 336 7532


Dept. of Water and Sanitation
LEGAL SERVICES
APPROVED
LS 12



15. GENERAL

- 15.1 No amendment, alteration, cancellation, variation of or addition to this Agreement shall be of any force or effect unless reduced to writing and signed by the Parties or their duly authorized representatives.
- 15.2 No extension of time or other indulgences granted by either Party in respect of their respective obligations will constitute a waiver of the Party's right to enforce compliance with the terms and conditions of this Agreement. Neither shall it constitute a negation of this Agreement.
- 15.3 This Agreement together with Annexures constitutes the entire Agreement between the Parties and neither shall be bound by any undertakings, representations, warranties, promises or the like not recorded therein.

16. SEVERABILITY

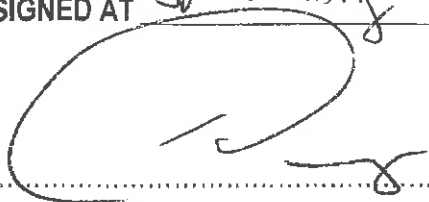
All the provisions of this Agreement will be severable and no provisions will be affected by the invalidity of any other provisions of the Agreement.



Dept. of Water and Sanitation
LEGAL SERVICES
APPROVED
LS 12

AUTHORISED SIGNATURES FOR AND ON BEHALF OF DEPARTMENT OF WATER & SANITATION

SIGNED AT Johannesburg ON THIS 6th DAY OF March 2016

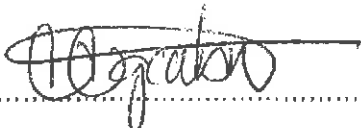


.....
**DIRECTOR-GENERAL
DEPARTMENT OF WATER & SANITATION**

WITNESSES: 1.....
2.....

AUTHORISED SIGNATURE FOR AND ON BEHALF OF DEPARTMENT OF ENVIRONMENTAL AFFAIRS

SIGNED AT PRETORIA ON THIS 12th DAY OF May 2016



.....
DEPARTMENT OF ENVIRONMENTAL AFFAIRS

WITNESSES: 1.....
2.....