

WfW Position Paper on Biocontrol

Introduction

The South African government is tasked with safeguarding and supplying adequate and safe water to approximately 44 million people. Invading alien plants in South Africa's catchments pose a serious threat to water security and biodiversity and also challenge the government in delivering this essential resource to all South Africans. Invading alien plants are only a component of managing water resource for a country with insufficient socio-economic infrastructure. In 1995, the Working for Water Programme (WfW), a government-led initiative was launched to specifically control the spread of invading alien plants. The operations of WfW are based on addressing ecological reparation.

WfW currently employs individually or in combination chemical (herbicides), manual (frilling, fires, etc) and biocontrol techniques to control and manage the spread of invading alien plants. Biocontrol remains an ideal control measure for WfW due to its self-sustaining, cost-effectiveness, long-term and ecologically safe attributes. Through its Research Management Unit, WfW has invested R 21m for 3 years on biocontrol research against 17 invading alien plants. The Plant Protection Research Institute and the University of Cape Town jointly undertake this research. Based on information published in 1998, the success rate of biocontrol in South Africa is comparable with that of other countries such as Australia and the United States of America. 8 species are under complete control, 14 species are under substantial control and 4 species are under negligible control. However promising biocontrol appears, it is faced with the logistical challenges such as legal and institutional arrangements, guaranteeing return on investment and skepticism regarding long-term ecological safety.

The legal framework for the control of invading alien plants

South Africa is a signatory to the Convention of Biodiversity (1992) which states that member countries are 'obliged to prevent the introduction of, control or eradicate those alien species, which threaten ecosystems, habitats or species'. The operations of WfW are mainly guided by the Conservation of Agricultural Resources Act 43 of 1983 (CARA), the National Environmental Management Act 107 of 1998 (NEMA), National Water Act of 1998, the Forestry Act 84 of 1998 and the National Veld and Forest Fire Act 101 of 1989. The regulations promulgated in terms of CARA classify invading alien plants or weeds in three categories. Category 1 plants must be removed with immediate effect, Category 2 plants are usually of commercial value and can only be grown with special permission and Category 3 plants are plants that may no longer be planted.

The legal framework regarding biocontrol of invading alien plants in South Africa is particularly based on CARA. This act categorizes invading plants and provides a guide to dealing with them accordingly. However, it lacks a substantive definition of an "invader plant" or "weed". This manifested in some invading alien plants categorized varyingly for different provinces. For example, Silver wattle *Acacia dealbata* is a category 1 plant in the Western

Cape and a category 2 plant in the rest of South Africa. Except for the expert recommendation that this variation should be maintained because of different user/demand needs, there are no criteria in place to deal with this inconsistency. Clearly, a concise and uniform definition of “invader plant” or “weed” must be constructed. This will establish a structured legal framework for dealing with issues related to invading alien plants. In addition the implementation of this national act becomes challenging for South Africa’s nine provinces. Each province has its own definition and nature conservation legislation for invading alien plants.

The lack of adequate biosecurity measures in South Africa is reflected in the inconsistencies amongst provinces. The provinces apply different measures to minimize and control existing and prevent further invasions. Furthermore, South African airports and some harbours have no guidelines or systems such as visual displays or an obligatory form on forbidden items for preventing entry of prohibited biological materials. The existing legislation including CARA does not provide clearly defined standards for dealing with intentional introduction of invading alien plants. CARA only makes provision for imposing penalties on non-compliance with the regulations controlling the further spread of invading alien plants that have already become a problem in the country.

A review of the available relevant legislation is necessary to identify gaps, strengths, weaknesses and inconsistencies. This review should take into consideration the known pathways and monitor ports of entry for invading alien plants. The intentional introduction of biocontrol agents for invading alien plants should be encompassed within this review.

Public concerns about biological control

Although biocontrol in South Africa has been used since 1913, the departments and individuals responsible for approving the release of biocontrol agents have to deal with public concerns over the long-term safety of biocontrol agents. Public skepticism relates to long-term ecological safety for releasing biocontrol agents outside their natural environment. In addressing these concerns, each release must be jointly approved by the National Department of Agriculture and the Department of Environmental Affairs and Tourism. Each application for release is reviewed under the Agricultural Pest Act 36 of 1983 and the National Environmental Management Act 107 of 1998, respectively. The latter requires that environmental impact assessments be undertaken as part of risk assessment.

Risk assessments for biocontrol over the past 100 years clearly show that biocontrol is an ecologically safe technique. To date, more than 350 biocontrol agents have been released globally with no damage to non-target plants. Only 8 instances of damage to non-target plants worldwide have been documented. This is evidence that guarantees that chances of host-shifts to non-target plants are miniscule. Clearly, the challenge to educate the public about the fact that generalist biocontrol agents are never released remains. Furthermore, the host-prey relationship between a biocontrol agent and its target plant should also ease any fears of host-shifts. This relationship

ensures that a balance is maintained between the invader populations and the biocontrol agent since the target plant will always exist to sustain biocontrol agents. This also emphasizes that biocontrol is not an eradication technique but a means to reduce invader plant populations to 'acceptable' levels.

It has been argued that the release of biocontrol agents may facilitate the transmission of microorganisms that may affect human and animal health. This is an ongoing debate that warrants more research. In addition, introducing biocontrol agents to an invaded area presents an anthropogenic change to an already modified ecosystem. The biocontrol agent and its target plant become part of this ecosystem. The incidence of crossbreeding of the introduced biocontrol agent with other closely related introduced or indigenous organisms cannot be ruled out. The fear is that this presents a potential threat to biodiversity since it may also result in extinction of indigenous insects. In addition, this crossbreeding may result in more aggressive organisms with modified feeding habits. Aside from the proven ecological safety of biocontrol, the incidence of crossbreeding of the introduced agent with already established introduced or indigenous organisms has never been reported. Neither host-shifts nor crossbreeding incidences have been documented worldwide for more than 350 released biocontrol agents with other introduced or indigenous organisms.

The benefits of biocontrol outweigh its main disadvantage of being a slow control option. Compared to chemical and manual control techniques, biocontrol remains the most cost-effective, least resource-intensive and hazardous technique. Since biocontrol is a species-specific technique, its application in infested sites ensures that only the targeted invading alien plants are controlled. Non-target plants are often at risk when chemical control, especially aerial sprays and manual techniques are used. Although chemical control is the quickest technique, it is the most expensive of the three. For example, chemical control of water hyacinth costs approximately R1 481/ha compared to R 309/ha of biocontrol. In South Africa, more than R6 million was spent on chemical control of water hyacinth between 1986 to 1999. This would have been significantly reduced had biocontrol or integrated control which costs approximately R277/ha, been used.

Institutional arrangements around biological control

The institutional framework for controlling the spread of invading plants places this responsibility on a number of government departments. There is currently no lead agency solely responsible for this complex task and the coordination between the responsible government departments is weak. The National Department of Agriculture and the Department of Environmental Affairs and Tourism must approve the release of biocontrol agents. Coordinating this task between these two departments without jointly agreed standards often results in costly (economic, time and human resource) delays in the release of biocontrol agents, as they must be kept in quarantine. Furthermore, the problem also gets worse during this delay. The legal and institutional arrangements become a hindrance to the release of biocontrol agents. A co-ordination mechanism with simpler and shared standards is required for these two departments. Alternatively, a committee with the relevant stakeholders

and experts can be formed and given the responsibility for this task for example, the Invasive Species Council in the United States.

The capacity to implement and enforce legislation related to the release of biocontrol agents also has to be developed within the relevant institutions. Another option for improving the efficiency of processing release permits for biocontrol agents is appointing an independent agency. This agency would develop a protocol with set standards and criteria to ensure timely processing of release applications. An example of such an agency is WfW, which is currently solely responsible for controlling the spread of invading alien plants.

Communication around biological control

The limited attention given to biocontrol communication within South Africa is a challenge for the biocontrol community. The latter have to communicate the efficiency of biocontrol, demonstrate the cost and benefits of this practice and its return on investment. The limited publicity for this academic and research field has been attributed to the fact that it is highly specialized, only offered at selected institutions within South Africa. In addition, it lacks a coordinated and strategic communication campaign. Despite a number of biocontrol information brochures and posters that have been produced and distributed, the resources allocated for distributing biocontrol information to the larger public appear inadequate. In order for biocontrol to be accepted by all stakeholders, its scientific and natural foundation with its minimal (if any) ecological impacts must be conveyed to all. The associated risks for example high capital costs without a 100% guarantee of efficiency must be shown. The use of media workshops and other public participation techniques needed in engaging and educating the broader public about biocontrol.

A regional approach to biological control

Many of Africa's water systems are shared between countries. For example, Orange River between South Africa and Namibia and Komati between South Africa and Swaziland. Isolated and unilateral initiatives to alleviate the socio-economic and environmental threats posed by invading alien plants within shared rivers are costly and inadequate. In line with President Mbeki's New Programme for African Development controlling the spread of invading alien plants within the African context particularly SADC, requires collaboration based on jointly agreed standards and legislation with common objectives. Procedures to minimize the introduction and control the spread of existing invasions must be put in place within SADC and Africa. Of the available control options, biocontrol remains the most cost-effective alternative for African countries, which have more urgent socio-economic issues to address.

It must be understood that although the biodiversity of any ecosystem fluctuates with natural geological and climatic occurrences, alien plant invasions are not part of these natural processes. Humankind primarily causes them (intentionally or unintentionally) since they facilitate the introduction of invading species into foreign environments. The subsequent dispersal of such plants can be natural wherein seeds are dispersed by birds, rivers and other animals. The public has to understand the process of invasion and be capacitated with respect to containing alien plants that have

not widely infested or invaded ecosystems. In this manner, the plight against invading alien plants would be shared by the government and the wider public.

Sustainable management of invading alien plants

One of the most effective ways of creating an awareness and sharing responsibility would be for the government to provide incentives within catchment management areas for preventing further spread and introduction of invading alien plants. Incentive schemes to serve as tools for improving the cooperation and collaboration amongst all stakeholders in controlling the spread of invading alien plants should be considered. The incentive-measures undertaken by the government should be relevant to the goal and be multi-faceted with the appropriate social, economic and legal aspects. Economic (tax) incentives could be considered for the horticultural industry, which supplies plants to gardeners, landscape architects and farmers. The benefits of WfW such as biodiversity can be offered to private landowners. In addition, tax incentives such as rebates could be put in place for landowners and land users that clear their land of invading alien plants.

The government must take a proactive role in controlling the spread of invading alien plants. An accurate scientific-based definition of an invading alien plant and an update of the existing information and inventory of invading alien plants are required. Models predicting the spread criteria and invading potential should be established with consideration given to invasiveness in other parts of the world, family or genus characteristics, fertility, ability to spread vegetatively and the available control options. Biocontrol remains an ecologically safe and cost-effective control option compared to mechanical and chemical techniques. However, its use must be safeguarded and guided by the appropriate biosecurity measures.

In facilitating effective and efficient policymaking, enforcement and regulation, the necessary legislation and departmental infrastructure must be established with input from the relevant stakeholders. This necessitates that awareness campaigns aimed at educating the public about alien organisms (invading alien plants and biocontrol agents) are properly undertaken. This also facilitates strengthening control measures to prevent further introductions from the various points of entry such as airports, harbours and borders. In being proactive, the government should invest in preventing more introductions and investigating integrated control programmes. This would enable finding long-term sustainable techniques for controlling the spread of invading alien plants.

Since biocontrol is economically and environmentally sustainable, it should form a major part of such integrated control programmes. The approach to each control programme should address whether a short-term quick solution or a long-term sustainable solution is required. Each programme should clearly outline whether it aims to control the spread of invading alien plants to 'acceptable levels' or eradicate them, bearing in mind the costs of such programmes within South Africa's socio-economic context.