MINISTRY OF WATER AND
ENVIRONMENTAL AFFAIRS

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water affairs

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MINISTER OF WATER AND ENVIRONMENTAL AFFAIRS

NATIONAL ASSEMBLY: QUESTION 2560 FOR WRITTEN REPLY

A draft reply to the above-mentioned question asked by Mrs A T Lovemore (DA); is attached for your consideration.

DIRECTOR-GENERAL (Acting)

DATE: 4/10/10

DRAFT REPLY APPROVED/~~AMENDED~~

MS B P SONJICA, MP
MINISTER OF WATER AND ENVIRONMENTAL AFFAIRS

DATE: 05/10/2010

NATIONAL ASSEMBLY

FOR WRITTEN REPLY

QUESTION NO 2560

DATE OF PUBLICATION IN INTERNAL QUESTION PAPER: 13 SEPTEMBER 2010 (INTERNAL QUESTION PAPER NO. 28)

2560. Mrs A T Lovemore (DA) to ask the Minister of Water and Environmental Affairs:

(1) What is the water usage of the tree species considered as alien invasive species and targeted for eradication by the Working for Water programme;

(2) whether research has been conducted into the water use of indigenous trees; if not, why not;

(3) whether such research is being conducted or is planned; if so, what has this research shown with regard to the water used by the species studied;

(4) why are alien invasive species that are removed not being replaced by appropriate tree species;

(5) whether research has been conducted into the effect on global warming when alien invasive species are removed; if not, why not; if so, what are the relevant details of the (a) research and (b) findings? NW3201E

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REPLY:

(1) A recent study (published in 2007) commissioned by the Water Research Commission (WRC) in partnership with my Department at Two Streams in KwaZulu-Natal, has shown that the stream flow increased by 75 000 m^3/year after the clearing of 65.4 hectares of Black Wattle invasions. In summary the following can be deduced from the study:

- The reduction in runoff due to the Black Wattle was 1 146 m^3/ha/year.
- The water loss per hectare from the riparian invasions was 2 100 m^3/ha/year which is twice as much water losses from the areas away from the streams (1 023 m^3/ha/year).

In addition, research results reflected in the attached **Annexure A** obtained from various studies of the former South African Forestry Research Institute, the Council for Scientific and Industrial Research (CSIR), the WRC and the Working for Water Programme between 1970 and 2000 further illustrate the impacts on stream flow of *Pinus* (pine) species (1 300 – 3 000 m^3/ha/year) and *Eucalyptus* (gum) species (2 000 – 3 400 m^3/ha/year) in Jonkershoek (Western Cape), Cathedral Peak (KwaZulu-Natal), Mokobolaan (Mpumalanga) and Westfalia (Limpopo).

(2) Yes, research has been conducted into the water use of indigenous trees. The title of the research was "Water use in relation to biomass of Indigenous tree species in woodland, forestry and/or plantation conditions".

(3) Yes, as indicated in paragraph 2 above, the research is ongoing and is led by the WRC with support from my Department and the Department of Agriculture, Forestry and Fisheries. The aim of the study is to find out how much water indigenous tree species use and how efficient indigenous trees use water in comparison with commercial plantations species. The preliminary results published in December 2008 found that the six species (indicated in Table 1 below) showed the best water use efficiency amongst

the species tested. These results can be compared to the water-use efficiency of commercial Eucalyptus and Pinus species. Generally commercial species use water more efficiently. However, an economic analysis done (commissioned by the WRC) took into account the value of the wood, found that the volume yield is not a major criterion affecting the economic viability of forests as the value of some indigenous timbers are much higher than that of commercial species.

Table 1: Six species which indicated the best water use efficiency

Species	**1 year water use (kg)**	**Water-use Efficiency (grams stem wood/kg water transpired)**	**Water-use Efficiency (g total wood/kg water transpired)**
Trema orientalis (Pigeon wood)	8 089.45	0.9612	1.3170
Celtis africana (white stinkwood)	8 395.87	1.5748	2.7306
Podocarpus falcatus (kalander yellowwood)	6 570.9	1.0441	1.2901
Ptaeroxylon oblilquum (sneeze wood)	4 406.97	1.3188	1.9514
Berchemia zeyheri (pink ivory)	6 102.88	1.6739	2.0099
Olea europaea subsp. africana (wild olive)	5 222.75	0.3129	1.0304

(4) The clearing of invasive alien plants is done for three objectives, to improve water security, biodiversity (and natural ecosystem functioning) and the productive potential of land. Furthermore, the approach to land restoration depends on what the main objective is, taking into account the cost implications. The following should therefore be noted:

In riparian and mountain catchments areas (watersheds) where the main objective is to optimise water resources, the aim will be to re-establish which will be optimal for stream flow. In the mountains catchments of the Western Cape for instance this vegetation will be Fynbos while in the Drakensberg of KwaZulu-Natal, Eastern Cape and Mpumalanga it will be Grasslands.

Generally vegetation recovers naturally after clearing. If the re-growth of the invasive alien plants is sufficiently suppressed the remaining indigenous species in the landscape will be enough for the area to recover well enough in order to restore natural processes.

There are however cases where dense multi-generational stand of invasive alien plants occur. In these cases there is hardly any indigenous species left in the landscape. Indigenous trees, shrubs or grasses will then be re-established (sown or planted in) to speed up or kick start the natural restoration process. This must however be kept to the absolute minimum as restoration could be extremely expensive. Preliminary results from an ongoing study have shown that it could cost up to R250, 000 per hectare to restore an area. This will only be feasible for very small critical areas such as river banks in transformed landscapes. Generally the target is to keep restoration costs (planting in or sowing of indigenous species) less than R10,000 per hectare where it is being considered. For these areas the department established nursery facilities in the Eastern Cape and at Kluitjieskraal forestry nursery in the Western Cape.

(5) Yes, some research is being done on the impacts of climate change on the potential future invasive potential of selected alien species by the South African National Biodiversity institute in collaboration with the CSIR, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), and the Department of Environment and Conservation for Western Australia funded by the Australian Department for Climate Change.

(5)(a) The research on the impacts of climate change on the ability of invasive alien plants species to out compete indigenous vegetation is being led by the South African National Biodiversity Institute.

(5)(b) So far one of the most significant findings was that the root and shoot systems of some *Acacia* species could become stronger which means that they will be able to access water deeper below the soil surface. This could make them more aggressive and increase the potential for invasions, leading to an even bigger threat to our natural resources and biodiversity. Recent work on the impacts of climate change on the commercial forestry industry can and will also be used as base reference for research into the potential threat of invasive alien species. Research in this field is ongoing but dependent on the availability of funding as it is generally very expensive.

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ANNEXURE A

Table 1: Results of impacts of alien invasive plants on the water usage

Long-term reductions in runoff measured in experimental catchments after commercial forestation

Catchment (Site)	Area (ha)	Mean annual rainfall (mm/a)	Mean annual reduction in runoff (mm/a)
Cathedral Peak (KwaZulu-Natal)	60 – 190	1 400	260 (2 600 m^3/ha·a
Jonkershoek (Western Cape)	30 – 250	1 300 – 2 300	130 – 300 (1,300 – 3,000 m^3/ha·a
Westfalia (Limpopo)	30 – 60	1 600	200 (2 000 m^3/ha·a)
Mokobulaan (Mpumalanga)	25	1 150	340 (3 400 m^3/ha·a)
Witklip (Mpumalanga)	110 – 160	1 475	280 (2 800 m^3/ha·a)

Riparian clearing experiments

Catchment (site)	Vegetation	Short-term average stream flow increase (m^3/cleared ha)
Zwartkops (Eastern Cape)	Wattle	13
Lydenburg (Mpumalanga)	Pines & Wattle	12
Witklip (Mpumalanga)	Pines & Scrub	22
Du Toitskloof (Western Cape)	Wattle & Eucalyptus	9
Oaklands (Western Cape)	Wattle & Eucalyptus	10
Somerset West (Western Cape)	Wattle & Eucalyptus	12
Jonkershoek (Western Cape)	Pines	31

Evapotranspiration measurements

Catchment (site)	Vegetation (riparian)	12-month evapotranspiration (mm)			
		Transpi ration	Interception	ET	Difference
Jonkershoek (Western Cape)	Wattle	1 318	171	1 489	157 (1570 m^3/ha a)
	Fynbos			1 332	
Karkloof (KwaZulu-Natal)	Wattle	1 077	183	1 260	424 (4 240 m^3/ha·a)
	Grasslands			836	

Riparian vs. non-riparian reductions in runoff

Catchment (site)	Treatment	1st year increase in stream flow after treatment (m^3/ha cleared)	Ratio of riparian: non-riparian increase
Witklip (Mpumalanga)	Clear riparian scrub & pines	7 965	1.9:1
	Clear non-riparian pines	4 045	
Biesiesvlei (Western Cape)	Clear riparian pines	11 505	3.4:1