Please provide to following details on the origin of this report

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Date of submission:	

Please provide summary information on the process by which this report has been prepared, including information on the types of stakeholders who have been actively involved in its preparation and on material which was used as a basis for the report

This report was prepared by incorporating views from the Agri-food and Veterinary Authority (AVA) of Singapore since AVA monitors the ornamental fish industry and regulates the import and export of animals and plants in Singapore.

The submission from AVA is based on the assessment of the impact of the introduction of alien species mainly on plant and animal health (biosafety) in Singapore. NParks has placed its emphasis on the clearance of exotic plant species which is an on-going activity.

Article 8h Alien species

1. What is the relative priority afforded to implementation of this Article and the associated decisions by your country?							
a) High		b) Medium		c) Low	✓		
2. To what extent are the resources available adequate for meeting the obligations and recommendations made?							
a) Good		b) Adequate		c) Limiting	✓	d) Severely limiting	

3. Has your country identified alien species introduced?	
a) no	
b) only major species of concern	✓
c) a comprehensive system tracks introductions	
4. Has your country developed national policies for addressing issues related to alien invasive species?	
a) no	✓
b) yes - as part of a national biodiversity strategy (please give details below)	
c) yes - as a separate strategy (please give details below)	
5. Has your country assessed the risks posed to ecosystems, habitats or species by the introduction of these alien species?	
a) no	
b) only some alien species of concern have been assessed	✓
c) most alien species have been assessed	
6. Has your country undertaken measures to prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species?	
a) no measures	
b) some measures in place	✓ (Please refer to Appendix 1)
c) potential measures under review	
d) comprehensive measures in place	

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7. Is your country collaborating in the development of projects at national, regional, sub-regional and international levels to address the issue of alien species?	
a) little or no action	
b) discussion on potential projects under way	✓
c) active development of new projects	
8. Does your national strategy and action plan address the issue of alien species?	
a) no	
b) yes - limited extent	✓
c) yes - significant extent	

Case-studies

9. Has your country submitted case-studies on the prevention of introduction, control, and eradication of alien species that threaten ecosystems, habitats or species, in response to the call by the fourth meeting of SBSTTA?	
a) no - please indicate below whether this is due to a lack of available case-studies or for other reasons	✓ (See further comments below)
b) yes - please give below any views you may have on the usefulness of the preparation of case-studies for developing a better biological understanding of the problem and/or better management responses.	
10. How many case-studies are available that could be used to gain a better understanding of the issues surrounding alien species in your country?	
a) none	✓
b) 1-2 - limited understanding	
c) >2 - significant information available	

Transboundary issues

11. Are known alien invasive species in your country also a problem in neighbouring or biogeographically-similar countries?	
a) not known	
b) none	
c) a few - but in general alien invasive species problems are specific	✓
c) more than a few - in general we share common problems with other countries	
12. Is your country collaborating in the development of policies and programmes at regional, sub-regional or international levels to harmonise measures for prevention and control of alien invasive species?	
a) little or no action	
b) discussion on potential collaboration underway	
c) development of collaborative approaches for a limited number of species	✓
d) consistent approach and strategy used for all common problems	

Further comments

9a. Lack of reliable monitoring and research data.

Singapore has an ongoing programme to clear alien species especially exotic plant species in the rainforest. Over the years, these exotic creepers have been striving along the edge of the rainforest and are an insidious threat to the remaining rainforest in Singapore. The invasive creepers are strangling and causing the death of old and mature trees. In addition, the creepers are also killing off young native saplings and preventing them from regenerating by smothering and stunting their growth.

The National Parks Board (NParks) has carried out 2 major projects to remove the exotic creepers and reforestation of native species in order to enhance the local flora species. The clearing took place at the Singapore Botanic Gardens (SBG) Rainforest and the Nature Reserves.

Singapore Botanic Gardens Rainforest

The 4ha SBG Rainforest is a remnant of the original primary forest that once covered Singapore and is of scientific and educational importance. In a study carried out by the researchers from the National University of Singapore (NUS), it was found that the plot was still surviving well after years of isolation. Though the rainforest is healthy, it was threatened by alien species which were competing with native ones for space and nutrients. Thus, the immediate need to clear the non-indigenous climbers and shrubs. A major weeding project to clear out the exotic species in the 4ha SBG Rainforest was carried out in 1992.

The Hongkong Bank's "Care-for-Nature" Trust Fund helped by donating a sum of $100,000 for this project which was organised by NParks. Student volunteers also assisted in the clearing of the exotics. Non-native species such as heliconia, dumb cane and creepers such as *Dioscorea* species were cleared.

After the non-native species were weeded out, native species which were propagated in the nurseries were planted in the 4ha rainforest. Though the replanting project was a success, the plot is constantly threatened by the aggressive creeper, *Dioscorea sanibariensis*. NParks continues to monitor the growth of these creepers and carries out weeding activities when the non-native species start to re-establish themselves again.

Nature Reserves

In 1997, a major project lasting about a year was carried out by NParks to remove exotic species which have spread extensively along a 3km stretch of rainforest at the edge of the Nature Reserves. The aggressive creepers were strangling the mature trees and stunting growth of saplings. In some cases, the trees were covered entirely with creepers. When lightning strikes, trees would fall because they are linked together by these invasive creepers, hence causing a "domino effect". These creepers consist of exotic species such as *Dioscorea* and *Mikania* species. Once there is a gap, exotic species such as rubber trees and *Clidemia* species will establish themselves immediately. Thus, there is an urgent need to clear the aggressive creepers before they penetrate into the rainforest.

Trees that were badly mutilated by creeper growth were removed after which students and volunteer groups started work on reforestation. The volunteers were taught how to do replanting and only native plants were planted.

Other areas in the Nature Reserves are also constantly being monitored for any invasive species that might adversely affect the native ones. Patches of forest were adopted by schools so as to assist NParks in carrying out long-term maintenance and this is also a good opportunity for the students to learn about ecology and given first-hand experience on management of ecosystem. Students also used this as an opportunity to do simple research on reforestation techniques. A booklet was produced to reflect the findings of the research and also served as educational materials to enhance public awareness on the protection of our remaining natural rainforest.