



Study on Native Plants for Enhancing Biodiversity of Rivers in the City

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Background

Concreted channel



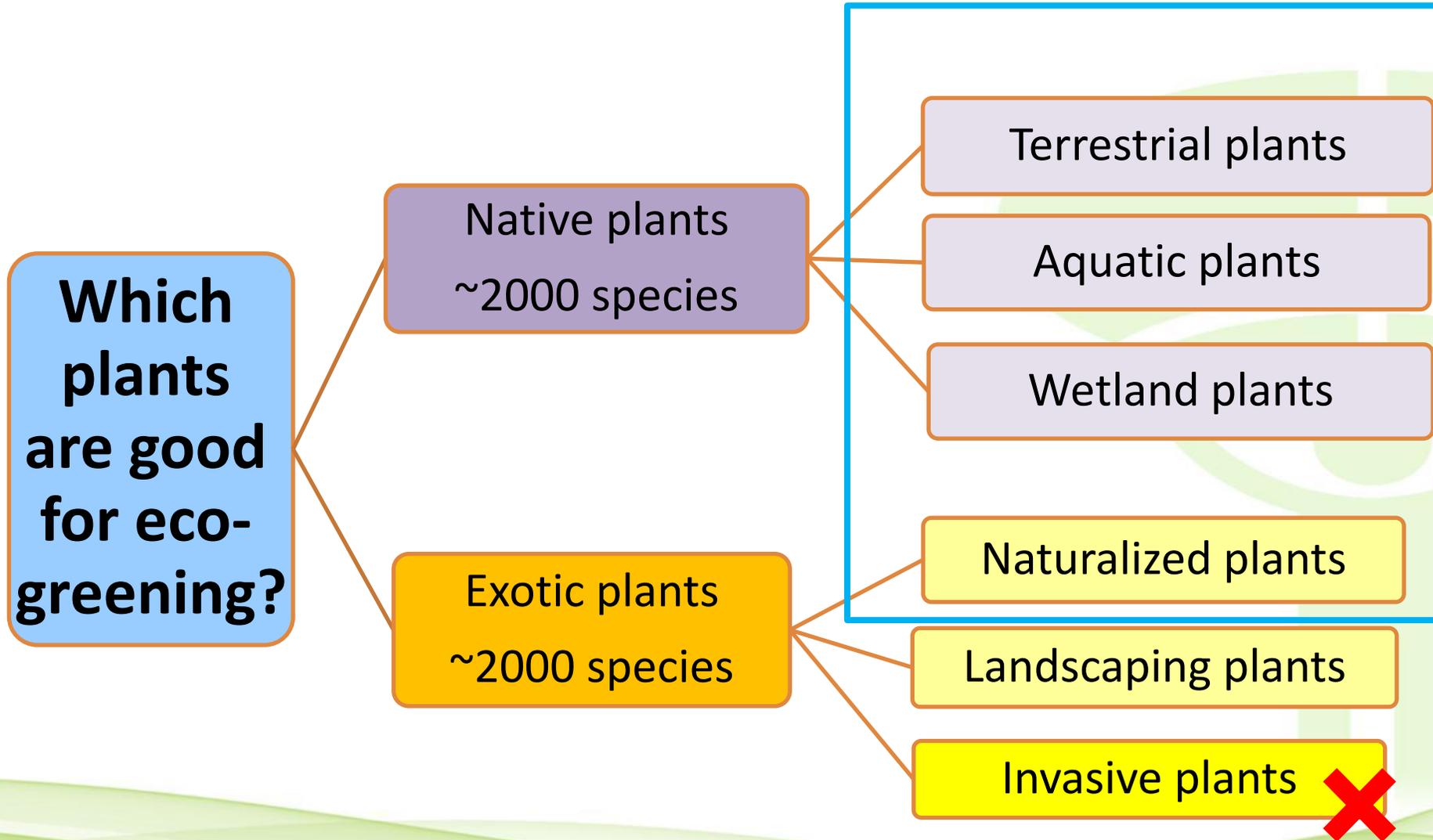
Eco-green river



- Planting can help
- create habitats
 - enhance biodiversity
 - provide landscaping features



Background





Study brief

Aim: To study species growth performance in various river sites

-  Task 1: Propagation and early growth in nursery
-  Task 2: Site planting trials





Species selection

- 🌿 native in priority
- 🌿 low hydraulic resistance
- 🌿 potential ecological functions
- 🌿 less studied and less available in market
- 🌿 perennial plants
- 🌿 tolerant to extreme drought / flood





Nursery propagation and early growth



Terrestrial plants were mainly propagated by seeds and then seedlings were transplanted to pots and kept in open air area



Water plants were mainly propagated by stem-cutting and then seedlings were transplanted to pots and kept in water trough



Summary of species propagation

- 🌿 71 native species were collected and observed, 55 species were further propagated.
- 🌿 Seed germination: suitable for terrestrial plants of larger seeds; usually takes 40-60 days to reach 70% germination rate.
- 🌿 Stem cutting: good for water plants with running stems (e.g. *Persicaria* spp.); usually takes 7-12 days to set roots, survival 50-70%.
- 🌿 Division: works for herbaceous water plants with fibrous roots (e.g. *Cyperus* spp.)

Propagation methods for species

Seed		Stem cutting		Division	
<i>Aegiceras corniculatum</i>	桐花樹	<i>Acorus gramineus</i>	金錢蒲	<i>Acrostichum aureum</i>	鹵蕨
<i>Bruguiera gymnorhiza</i>	木欖	<i>Bacopa monnieri</i>	假馬齒莧	<i>Coix lacryma-jobi</i>	薏苡
<i>Celosia argentea</i>	青葙	<i>Boehmerianivea</i>	苧麻	<i>Cyclosorus interruptus</i>	間斷毛蕨
<i>Coix lacryma-jobi</i>	薏苡	<i>Commelina diffusa</i>	節節草	<i>Cyperus malaccensis</i>	茳芏
<i>Crinum asiaticum</i>	文殊蘭	<i>Floscopa scandens</i>	聚花草	<i>Eleocharis ochrostachys</i>	假荸薺
<i>Crotalaria pallida</i> var. <i>obovate</i> *	豬屎豆*	<i>Limnophila chinensis</i>	中華石龍尾	<i>Equisetum debile</i>	筆管草
<i>Crotalaria retusa</i>	吊裙草	<i>Persicaria babarta</i>	毛蓼	<i>Juncus effusus</i>	燈心草
<i>Desmodium</i> <i>Heterocarpon</i>	假地豆	<i>Persicaria chinensis</i>	火炭母	<i>Leersia hexandra</i>	李氏禾
<i>Ludwigia octovalvis</i>	毛草龍	<i>Persicaria dichotoma</i>	二歧蓼	<i>Phragmites australis</i>	蘆葦
<i>Sida rhombifolia</i>	白背黃花稔	<i>Vitex rotundifolia</i>	白背蔓荊	<i>Saururus chinensis</i>	三白草
<i>Urena lobata</i>	尚梵天花			<i>Schoenoplectus triangulatus</i>	水毛花



Site planting trials

We wanted to know are these plants able to...

- survive and establish in such environments?
- sustain in such environment with minimal maintenance?
- change the environment?

- At typical DSD sites with minimal management.
- Summarized from different sites and trials.



Site planting trials

- 🌱 Planting method: Basic and simplest way- put the root ball into holes/crevices;





Planting trial sites





Planting Site 1 – Man Uk Pin

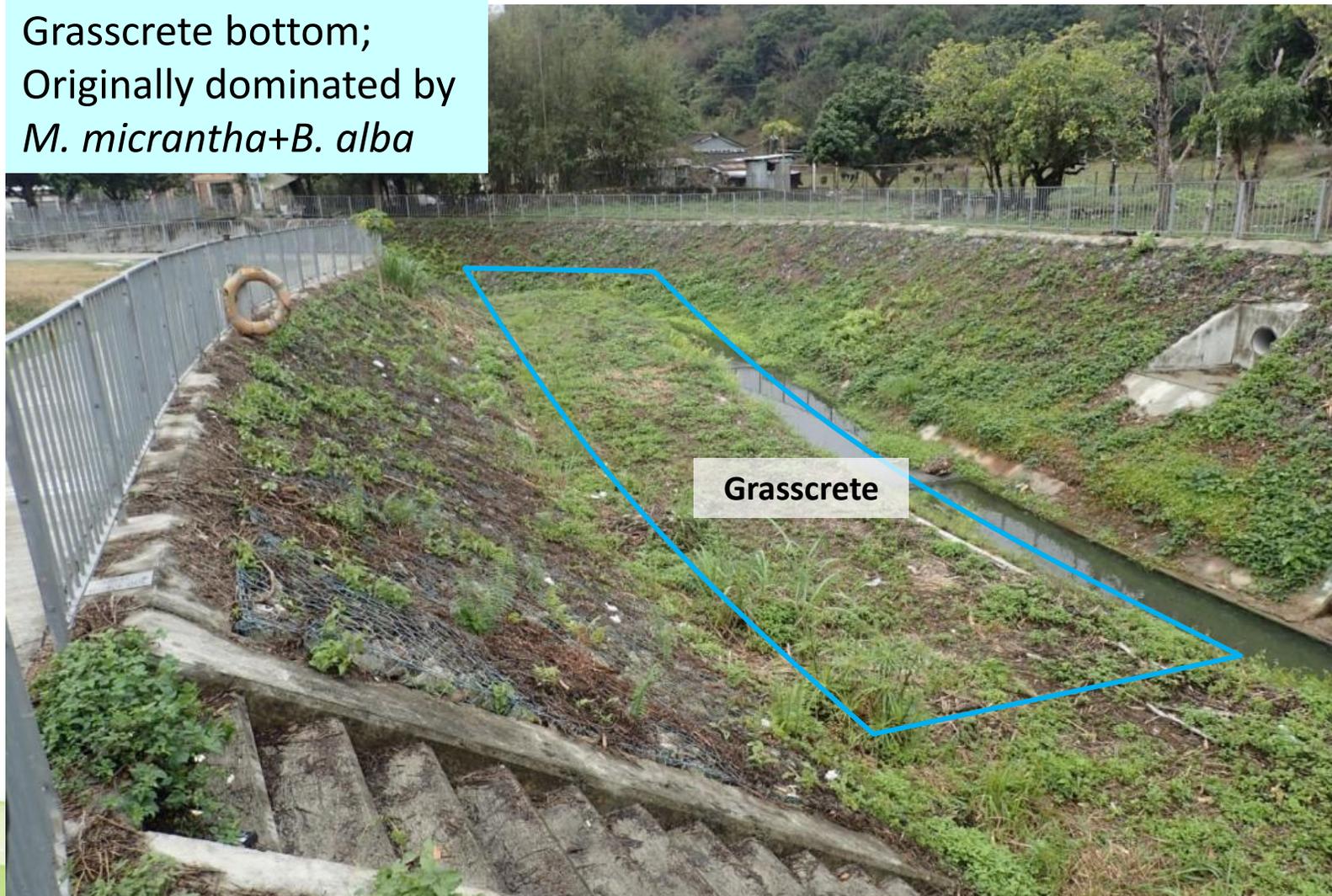
Rip-rap bottom;
Originally dominated by *B. mutica*+*M. micrantha*+*B. alba*





Planting Site 2– Kau Lung Hang

Grasscrete bottom;
Originally dominated by
M. micrantha+*B. alba*





Planting Site 3– Tai Tong Wu

Small boulders
bottom;
Originally dominated
by *grasses*





Observations and summaries of planting trials- Could the plants survive?

- 🌿 Survival: not whole plant dead/lost in two months after planting
- 🌿 Yes...to all 31 species planted

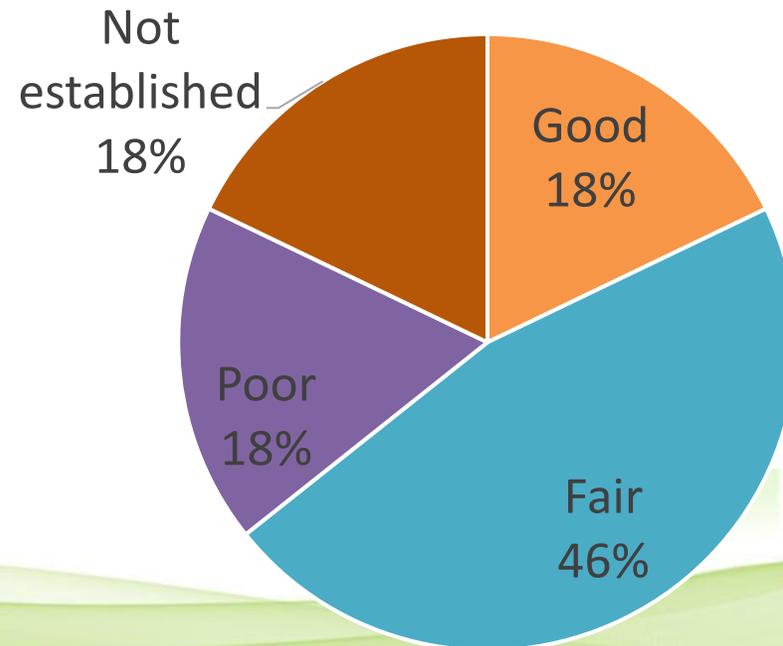


Observations and summaries of planting trials- Could the plants establish?

- 🌱 Establishment: set roots and flourish for >6 months
- 🌱 No simple answer to all species (23/28 species)
- 🌱 Species dependent, plant condition, planting time



Species growth performance



Growth performance of 23 established species

Good	Fair	Poor
<i>Acorus gramineus</i> 金錢莆	<i>Alternanthera philoxeroides</i> 空心蓮 子草	<i>Equisetum debile</i> 筆管草
<i>Hedychium coronarium</i> 薑花	<i>Alternanthera sessilis</i> 蝦鉗菜	<i>Limnophila chinensis</i> 中華石龍尾
<i>Persicaria pubescens</i> 伏毛蓼	<i>Celosia argentea</i> 青葙	<i>Persicaria chinense</i> 火炭母
<i>Ruellia coerulea</i> 翠蘆莉*	<i>Coix lacryma-jobi</i> 薏苡	<i>Persicaria dichotomum</i> 二歧蓼
<i>Commelina diffusa</i> 節節草	<i>Crinum asiaticum</i> 文殊蘭	<i>Vitex rotundifolia</i> 白背蔓荊
	<i>Crotalaria pallida var. obovate</i> 豬屎 豆*	
	<i>Desmodium heterocarpon</i> 假地豆	
	<i>Ludwigia hyssopifolia</i> 草龍	
	<i>Ludwigia octovalvis</i> 毛草龍	
	<i>Ludwigia perennis</i> 細花丁香蓼	
	<i>Polygonum barbatum</i> 毛蓼	
	<i>Sida rhombifolia</i> 白背黃花稔	
	<i>Urena lobata</i> 尚梵天花	



Plant condition (as in Aug 2020)

Coix lacryma-jobi 薏苡



Persicaria barbata 毛蓼



Desmodium heterocarpon 假地豆



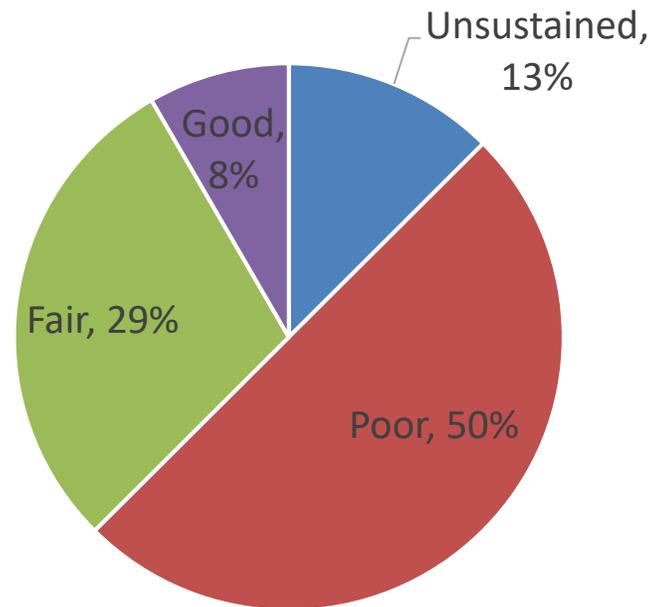
Urena lobata 肖梵天花



Observations and summaries of planting trials- Could the plants sustain?

 Sustain: keep growing in the site for >2 years

Growth of 24 plant species after 2 years



 ■ Unsustained ■ Poor ■ Fair ■ Good

Growth performance of 21 sustained species

Good	Fair	Poor
<i>Acorus gramineus</i> 金錢莆	<i>Alternanthera philoxeroides</i> 空心莧	<i>Celosia argentea</i> 青葙
<i>Commelina diffusa</i> 節節草	<i>Alternanthera sessilis</i> 蝦鉗菜	<i>Crinum asiaticum</i> 文殊蘭
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	<i>Ruellia coerulea</i> 翠蘆莉*	<i>Ludwigia hyssopifolia</i> 草龍
	<i>Vitex rotundifolia</i> 白背蔓荊	<i>Ludwigia perennis</i> 細花丁香蓼
	<i>Ludwigia octovalvis</i> 毛草龍	<i>Persicaria chinense</i> 火炭母
	<i>Urena lobata</i> 尚梵天花	<i>Persicaria dichotomum</i> 二歧蓼
		<i>Sida rhombifolia</i> 白背黃花稔



Observations and summaries of planting trials- Could the plants change the site?

🌿 Suppress growth of aggressive weeds? → Unlikely by planting alone



An overview of MUP site

 Planting + selective weeding → Vegetation change:
increase in plant diversity and complexity



More micro-habitats and food plants for animals





Overall summary

- 1) 71 species collected, 55 species propagated, 28 species were planted, 23 species established, 21 species sustained in the sites, 11 of them had satisfactory growth performance.
 - Only a few of them could adapt to broader range of environments
 - Most species need suitable environment to guarantee good growth
- 2) What make species successful?
 - Species taller than most weeds (e.g. >1.3m);
 - Fast establishment;
 - Well-branched
- 3) Two critical challenges: water availability and weed competition; amount of soil has less effect;
- 4) Plant community at site is dynamic → how to maintain?