ETHEKWINI MUNICIPALITY

By 2030 eThekwini will be Africa's most caring and liveable city

Integrated Plant Biodiversity Conservation: Its relevance in cities within biodiversity hotspots

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Natural vegetation of a city…….

- Important for ecosystem services in cities
- These service include:
  Recreation
  Health
  Traditional and cultural practices
- Ecosystem services need to be sustainable
- Plant Biodiversity Conservation is important to ensure sustainable

Policies and legislative frameworks to implement plant biodiversity conservation in all spheres of government

Global Strategy for Plant Biodiversity Conservation (updated 2011 – 2020)

Objective I

Plant diversity is well understood, documented and recognized

Objective II

Plant diversity is urgently and effectively conserved

Objective III

Plant diversity is used in a sustainable and equitable manner

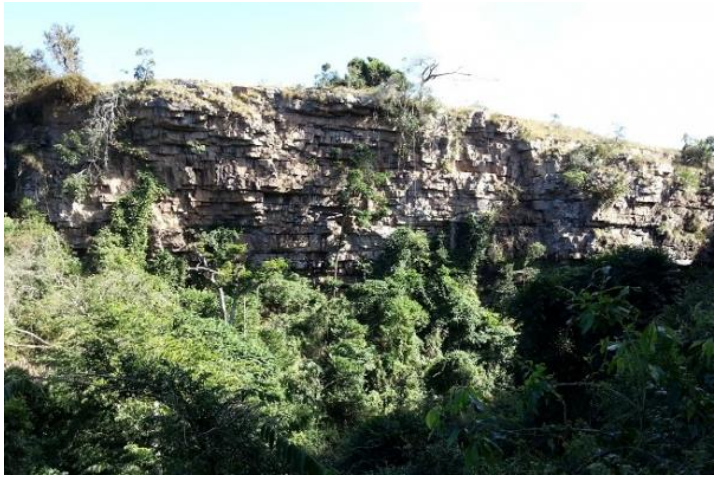
Objective IV

Education and awareness about plant diversity, its role in sustainable livelihoods and importance to all life on earth is promoted

Objective V

The capacities and public engagement necessary to implement the strategy have been developed

In situ conservation in natural sites (reserves etc..)



Challenges with *in situ* conservation

- Climate change
- Habitat destruction
- Urbanization
- Unsustainable harvesting practices
- Competition with alien vegetation
- Agricultural practices

Ex situ conservation

Classical approach

- Field collection in parks & botanic gardens collections

- Seed banks

More recent approach applying tools of biotechnology

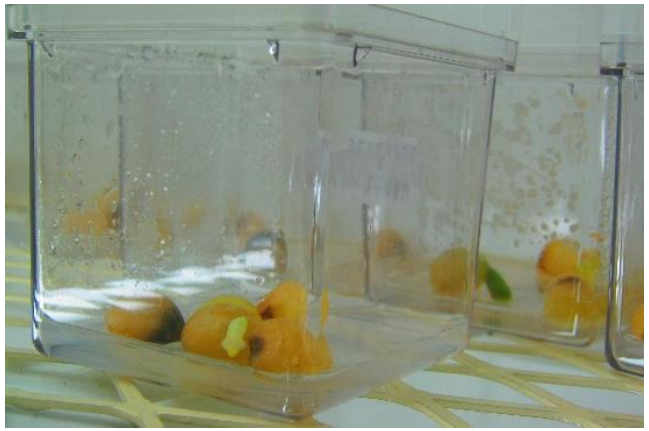
- *In vitro* collections in growth rooms of tissue culture laboratories

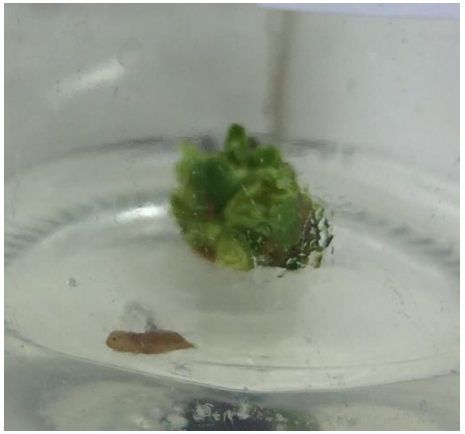
- Cryopreservation (storage of plant material long term in liquid nitrogen)

Tissue Culture

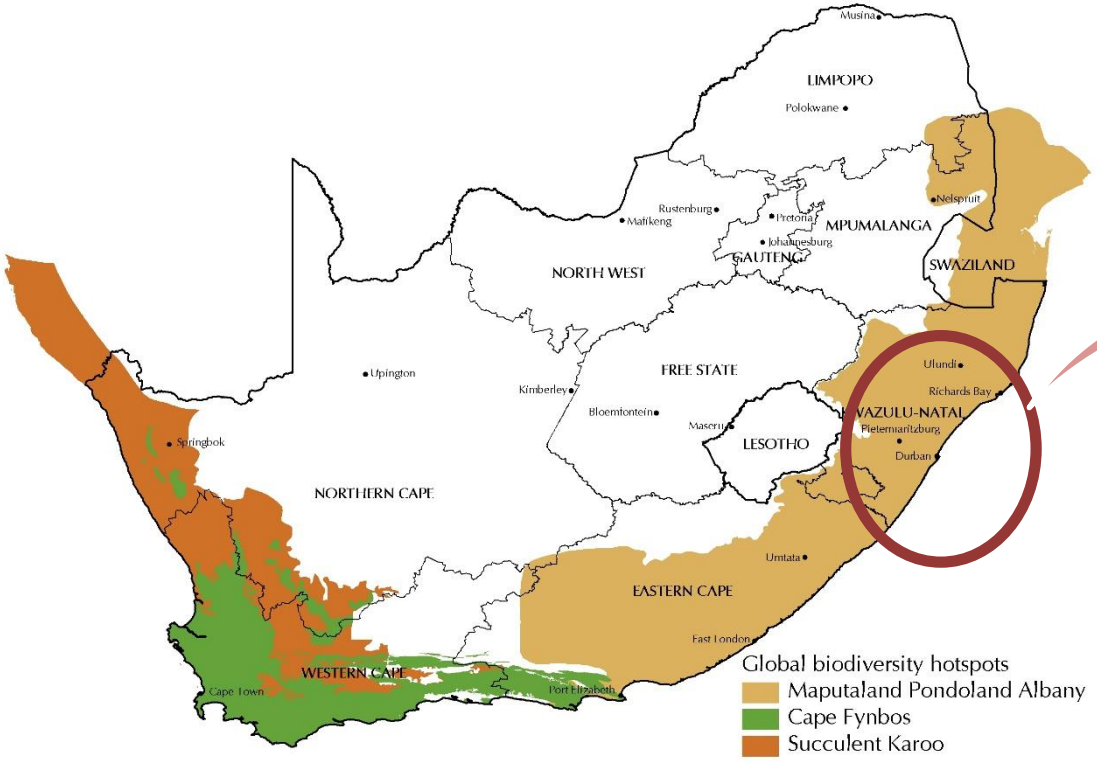
Defined as:

Science of growing plant cells, tissues or organs on a predetermined medium in a sterile controlled growing environment





South Africa - Biodiversity hotspots



City of Durban

Challenges with some threatened species

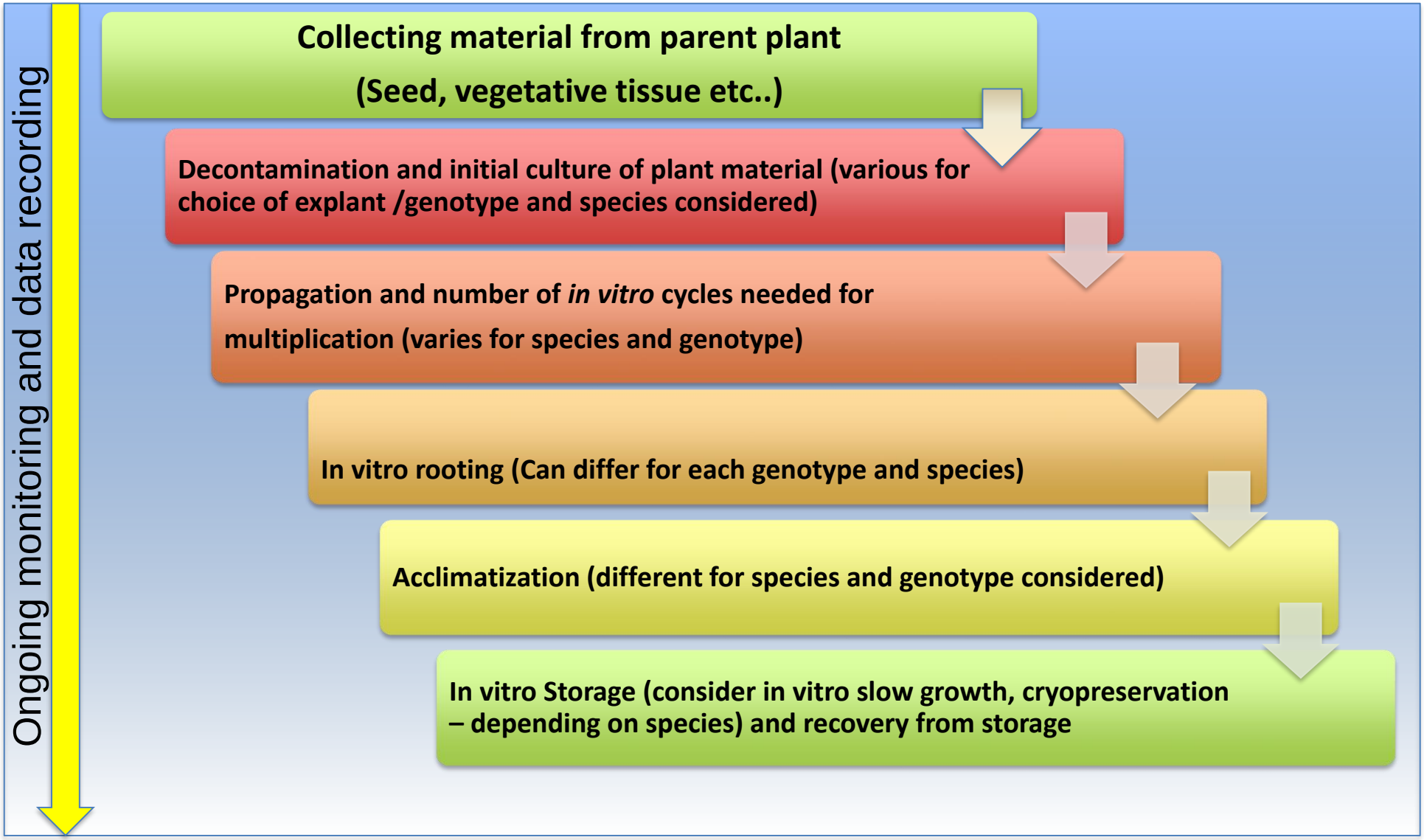
- species producing recalcitrant seeds
- poor seeders
- reduced population sizes make seed production difficult
- Propagation by cuttings is also season dependent
- Delays in rooting of cuttings is also a problem

Integrated plant biodiversity conservation

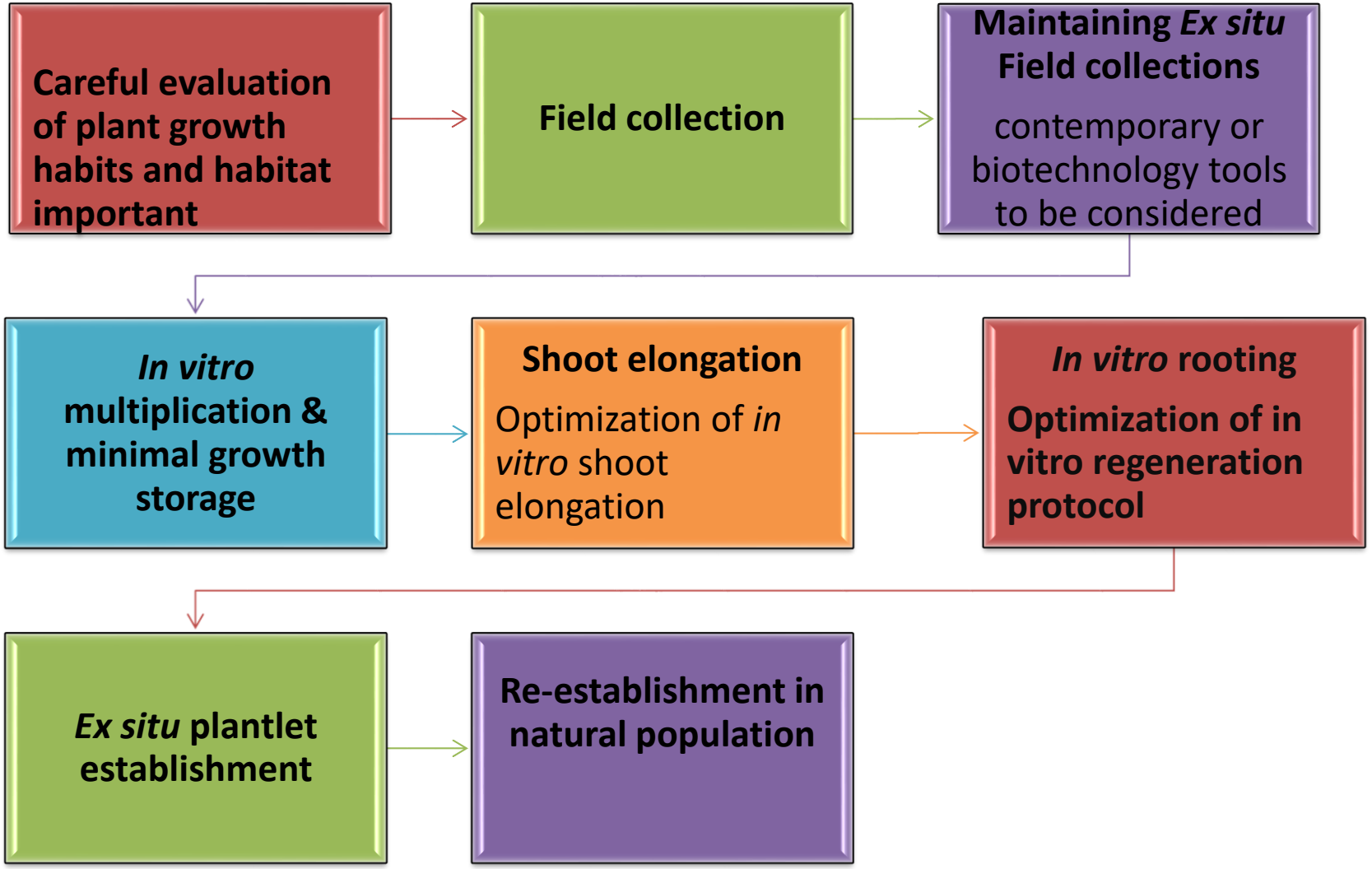
- Tools of *in situ* and *ex situ* conservation
- Working hand in hand
- Multidisciplinary working groups – collaborative approach
  - Professionals
  - Specialists
  - Passionate hobbyists
  - Research students
  - Academic staff

Factors to be considered when applying *in vitro* tools for endangered plant species

Procedure to consider for *in vitro* growth and maintenance



Factors contributing to costs of this conservation strategy



Our programme include

IUCN category	Within KZN Region		In our programme	
	No. of species	**%**	**No. of species**	**%**
Extinct	7	2	-	-
Extinct in the wild	4	1	1	5,9
Critically endangered	6	11	-	-
Vulnerable	41	28	7	41
Data Deficient	112	31	5	29
Near threatened	84	25	3	18
Least concern	290	21	3	18
Total	**682**		**19**	

R&D opportunities created from this approach

	Current status
Protocol optimization	Currently in progress: development of *in vitro* propagation protocol for various indigenous species
Troubleshooting	1. Evaluating the response of shoots to different growth regulators for *in vitro* rooting – BTech horticultural / biotechnology student supervised projects 2. Assessing different procedures for *ex situ* plantlet establishment (various growing media)
Novel R&D project	Developing a model for seed storage indigenous species – model - modification established standards from the standards for plant germplasm storage

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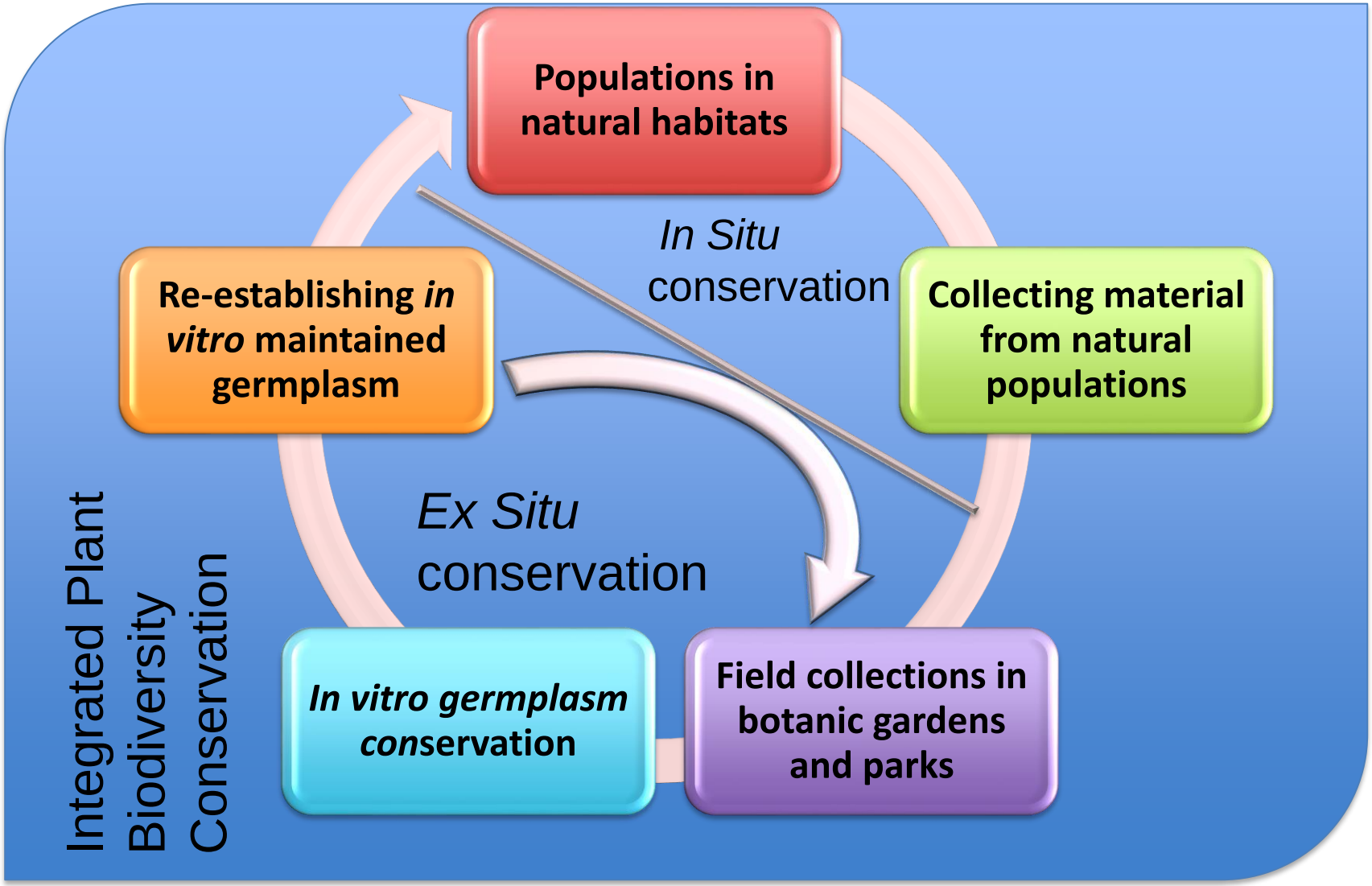
Troubleshooting	1. Evaluating the response of shoots to different growth regulators for *in vitro* rooting – BTech horticultural / biotechnology student research projects 2. Assessing different acclimatization for *ex situ* plantlet establishment (various growing media)
Novel R&D project	Developing and evaluating seed storage behaviour for indigenous species – applying and modifying genebank standards

Some challenges of applying *in vitro* tools for endangered plant species

- Collecting and transporting from wild population to the lab requires permits, application process are long ended and application fees required
- Monitoring at every stage of *in vitro* maintenance
- Provisions must be made for specialist technical and field professionals to work in collaboration (creating regional, national and international networks)
- Tissue culture facilities need to be build – initial start up costs high however creating partnerships with relevant research institutes with available tools important


Populations in natural habitats
In Situ conservation
Collecting material from natural populations
Re-establishing in vitro maintained germplasm
Ex Situ conservation
In vitro germplasm conservation
Field collections in botanic gardens and parks
Integrated Plant Biodiversity Conservation


THANK
YOU