

Ex-situ conservation in animal biodiversity



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*Construction of a national and regional network for the ex-situ conservation of animal biodiversity
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Main research and development questions

- Why do we need to conserve the animal biodiversity ?
- What is the nature and status of threats to animal biodiversity ?
- What forms of conservation must be required ?
- Nature & status of threats *versus* appropriate conservation methods ?
- Some key findings ?
- What are the key knowledge gaps ?
- What are the priorities for actions ?



➤ Why do we need to conserve the animal biodiversity ?

**Indochina peninsula / Vietnam = world hot spot of biodiversity (microorganisms, plants, animals)
(10 % of the world mammals birds and fishes species)**

For multiple reasons and to answer to ≠ types of threats

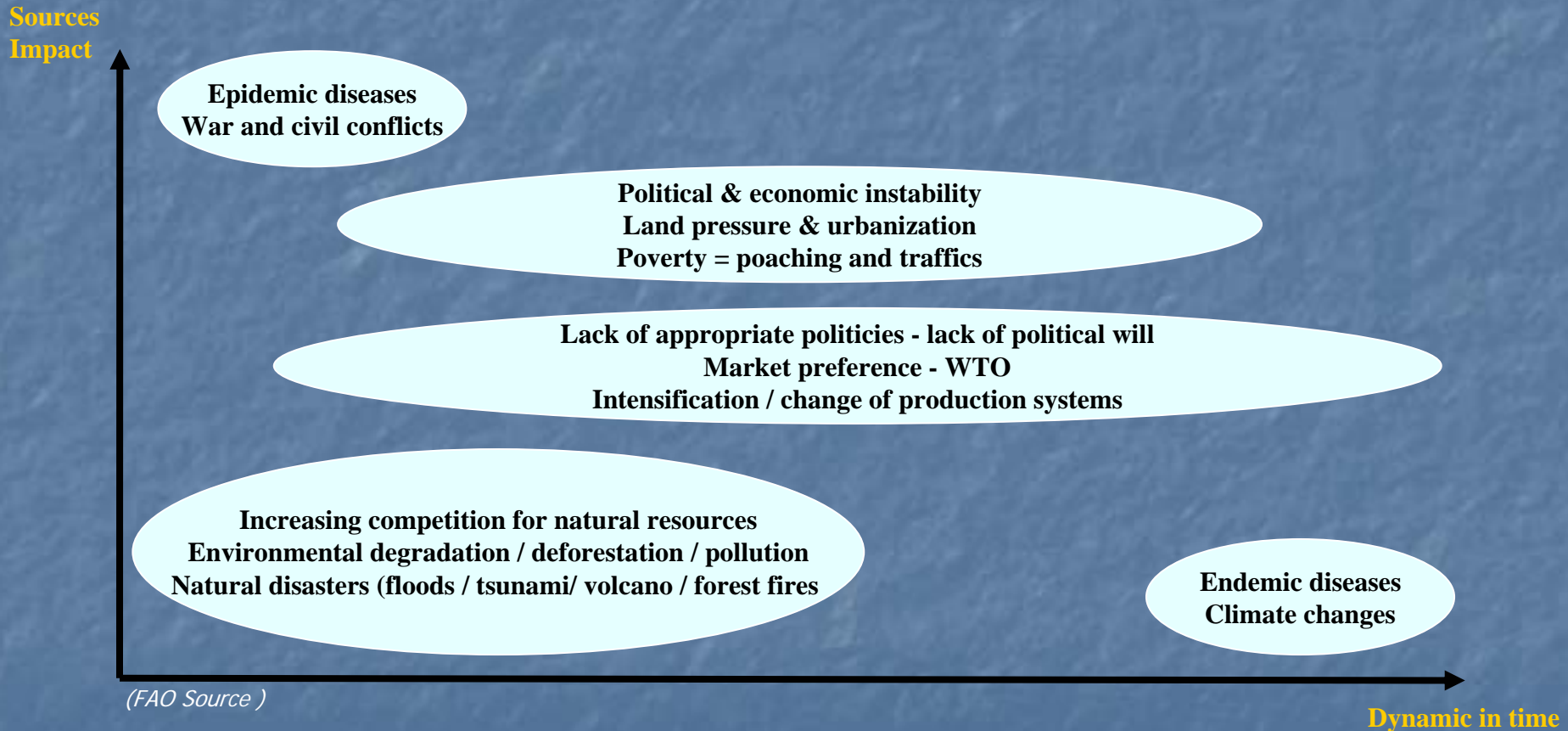
Justifications differ between farm animals (domesticated from wild related species) and wild animals

- to prevent genetic degeneration and erosion of populations that retain value for current use
- to maintain a sufficiently broad genetic diversity to meet the needs of current and future utilization
- to provide sustainable genetic resources for cross breeding and development of new genotypes well adapted (disease resist.)
- to provide options for adaptation to changing environmental conditions
- to provide sustainable animal production systems for food security
- to provide options to meet the demands of new markets for livestock products (wild meet, quality label aspect...)
- to develop new functions to benefit keepers and society in general
- to preserve cultural and historical values (pets, NCA)
- to sustain the bequest (heritage) value for the future generations
- to fulfil the rights of an existing genetic resource to continue to exist
- to reply to the acceleration (x100) of world global species extinction



➤ What is the nature and status of threats to animal biodiversity ?

Threats to biodiversity in the world and particularly in the developing countries have increased in recent years, mainly due to direct or indirect human activities and needing urgent actions to limit the increasing loss of this animal biodiversity



➤ What forms of conservation must be required ?

Generally 3 forms are considered: *in situ (in vivo)*, *ex situ in vivo*, *ex situ in vitro*

In practice, it is sometimes difficult to exactly determine where *in situ* conservation ends and where *ex situ in vivo* conservation begins

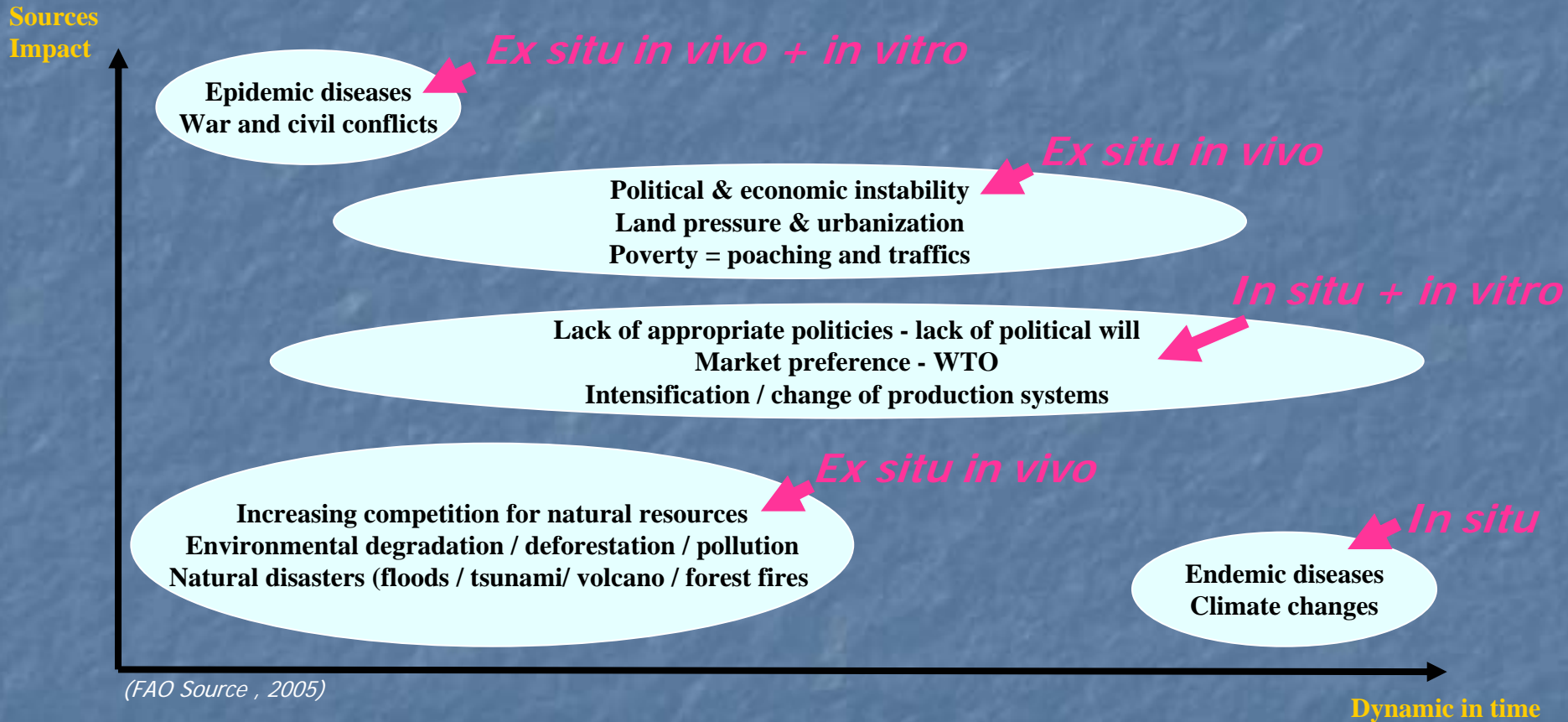
The choice of the most adapted form of conservation depends of the context and more often a mix combination could be more convenient

Objectives	Methods	Ex situ	
	In situ	In vivo	In vitro
Current livelihood value	X X X	X X	X X
Maintain of diversity	X X X	X X	X X
Rehabilitation after crisis / extinction risk	0	X	X X X
Insurance for future needs	X X X	X	X X
Cultural / historical value	X X	X	X X
Bequest / Heritage	X X X	0	0
Ecological conservation / back up	X X X	X	X
Research / Education	X X	X X	X

(FAO source, 2005)



➤ Nature and status of threats *versus* appropriate conservation methods



➤ Some key findings (1)

***In situ* approaches (community based management and conservation) are the preferred methods of conservation where maintenance and management is the best available livelihood option for the people involved**

***In situ* conservation is most convenient to be established as a preventive measure to protect against loss of FAnGR**

***Ex situ* live animal conservation in institutional or communally owned herds or flocks can successfully be used to support conservation of animal that have current value**

Few examples of *ex situ in vivo* conservation of animal biodiversity were identified in the developing world

Key factors for success of *ex situ in vivo* conservation programmes are:

- Sustained fundings (most often government findings)
- Appropriate policy environment to supports the establishment and maintenance of *ex situ* populations
- Ability and capacity of governement institution or farmer groups to organise and maintain the *ex situ* populations
- Continued use and benefit to people



➤ Some key findings (2)

The majority of sustainable *in vivo* (*in situ* and *ex situ*) approaches to conservation in the developing world will be linked to promotion of livelihoods

In vitro conservation is urgently required to provide a secure backup for biodiversity of the developing world to protect against a variety of threats that can drive to extinction faster than monitoring can identify and alternative conservation approaches can respond to.

Cryo-conservation can act as a back up to secure biodiversity from external threats.

In emergency situations, populations can be restored from cryo-bank after crisis.

Cryo-banks can also provide insurance against inappropriate genetic improvement programmes

Assesment of tissue cryo-preservation under various genetic conservation

Purpose	Semen	Embryos	Oocystes	Somatic cells	PGC(*)
Support breeding of small popul.	X X X	X X	X	0	?
Emergency (epid. Dis., war, nat.	X X X	0	X	0	X
Breeding programmes	X X X	X X	X	0	?
Back up of population in use	X X X	X X X	0	0	X
Trait selection	X X X	X X X	X	X	?
Germplasm exchange	X X X	X X X	X	0	X
Breed reconstruction	X X X	X X X	X	0	X

(FAO Source , 2005)

(*) Primordial Germ Cells



➤ Some key findings (3)

It is recognised that various methods of conservation are complementary with dynamic interactions among methods. A detail analysis is required leading to a coherent strategy for conservation that will include an appropriate combination if *in situ* and / or *ex situ in vivo* and / or *in vitro* conservation methods

A framework can guide decision making at national, regional and international levels on a suitable combination of conservation strategies for a given species based on the evaluation of the severity and speed of the threats it is exposed to, the nature of its value and the capacity for action

There are many issues in common between conservation of biodiversity and conservation of other components of agrobiodiversity. There will be considerable benefits from integrated approaches sharing resources and knowledge with other areas of agrobiodiversity



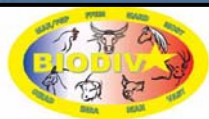
➤ What are the key knowledge gaps ?

Poorly developed knowledge and information systems and low levels of information gathering

A lack of analysis and design of policy and regulatory frameworks

Update and development of decision frameworks and guidelines for prioritisation and operation of characterisation, conservation and improvement

Limited understanding of valuation methods suitable for valuing animal biodiversity and limited information on the values and costs of conservation



➤ What are the priorities for actions (1)

Ensure policy development that supports conservation of biodiversity and utilisation of appropriate populations of interest

Show to the governments and funding agencies, the benefits and costs of conservation and raise awareness of the issues

Establish international funding mechanisms, legal frameworks and advocacy to support the actions of many developing countries

Develop policy and guidelines for biosafety, exchange, ownership, access and benefit sharing of animal biodiversity

Capture all existing information on biodiversity into an internationally accessible information system and couple this with tools for analysis and interpretation of information and of decision making

Identify hotspots of diversity and identification of the most threatened biodiversity within those hotspots and take action to conserve from now

Establish early warning and response systems for emergency threats to biodiversity



➤ What are the priorities for actions (2)

Undertake a critical analysis of the economies of scale in various conservation actions and interventions such as cryo-conservation, *in vivo* conservation priority setting and development of focal points

Determine the most appropriate system for regional and / or international cryo-conservation programs as a backup for developing world biodiversity

Develop national and regional capacity for cryo-conservation, including the development of human and technical resources

Improve the technologies and reduce costs of cryo-conservation of gametes, embryos and somatic cells of most species

Complete global surveys of the molecular genetic diversity of the major species of different interest

What institutional arrangements may be required to address these actions ?





Thank you for your attention



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