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Inventory and risk assessment of water dependent ecosystems in the Daly basin - Presentation to the Department of Lands, Planning and Environment

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March 2001

supervising scientist

INVENTORY AND RISK ASSESSMENT OF WATER DEPENDENT ECOSYSTEMS IN THE DALY BASIN

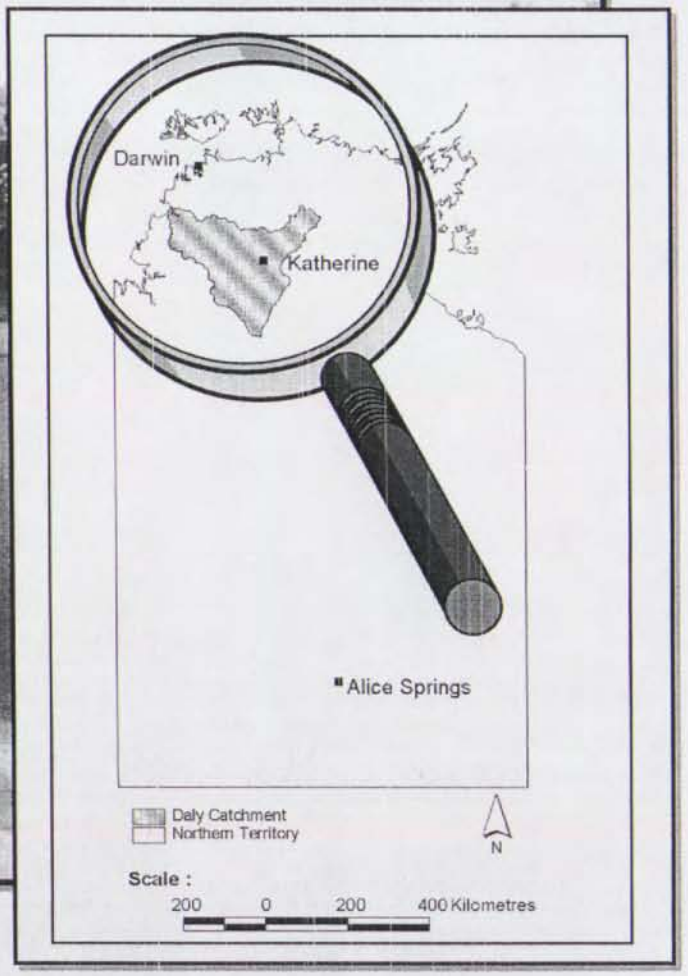
For the Department of Lands, Planning and Environment

Environmental Research Institute of the Supervising Scientist

DLPE Presentation 21March 2001

Project Objectives

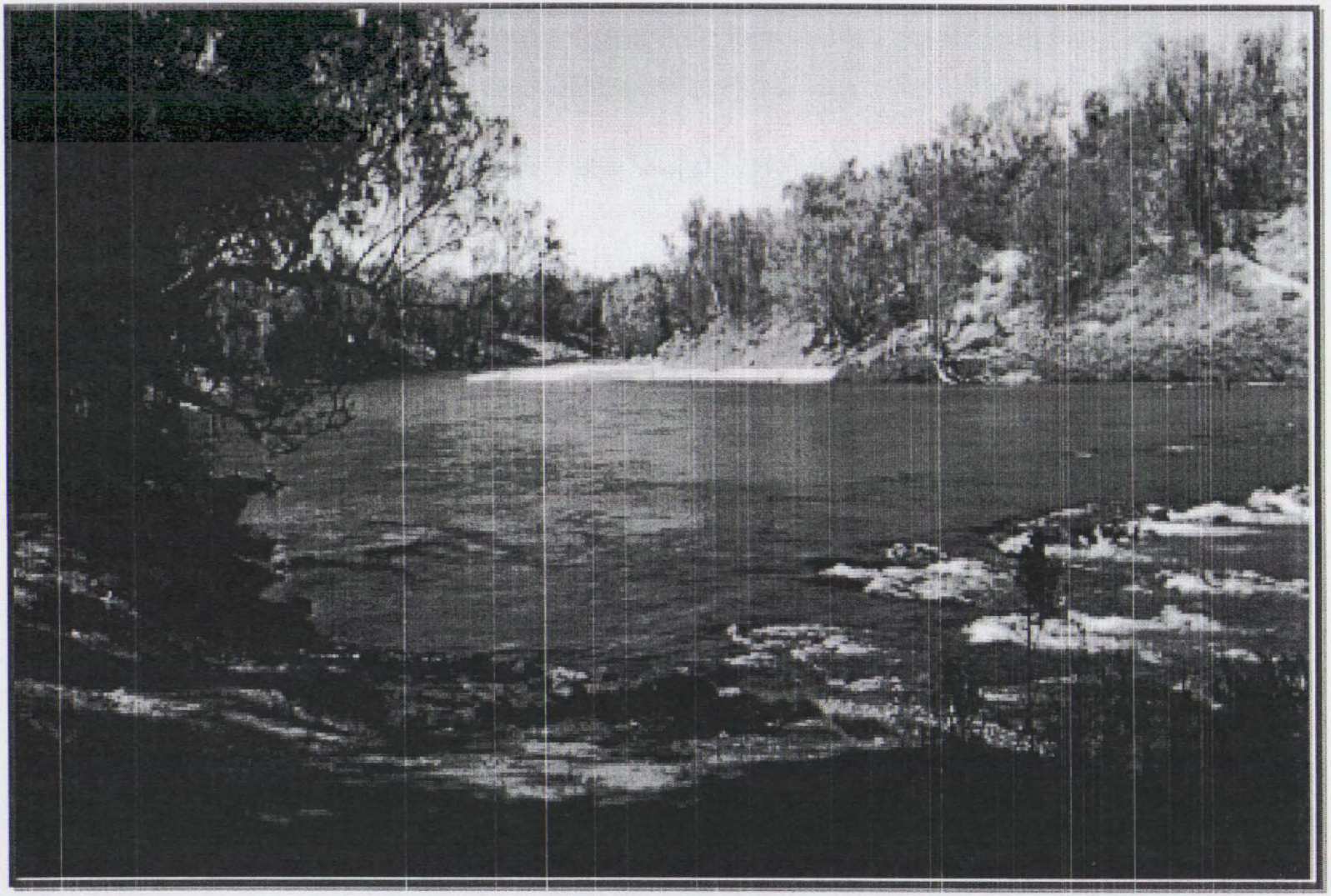
- inventory of wetlands
- map and store information in a GIS
- capture existing and forecast landuse
- Establish threats to wetlands
- identify wetlands at most risk



Classification

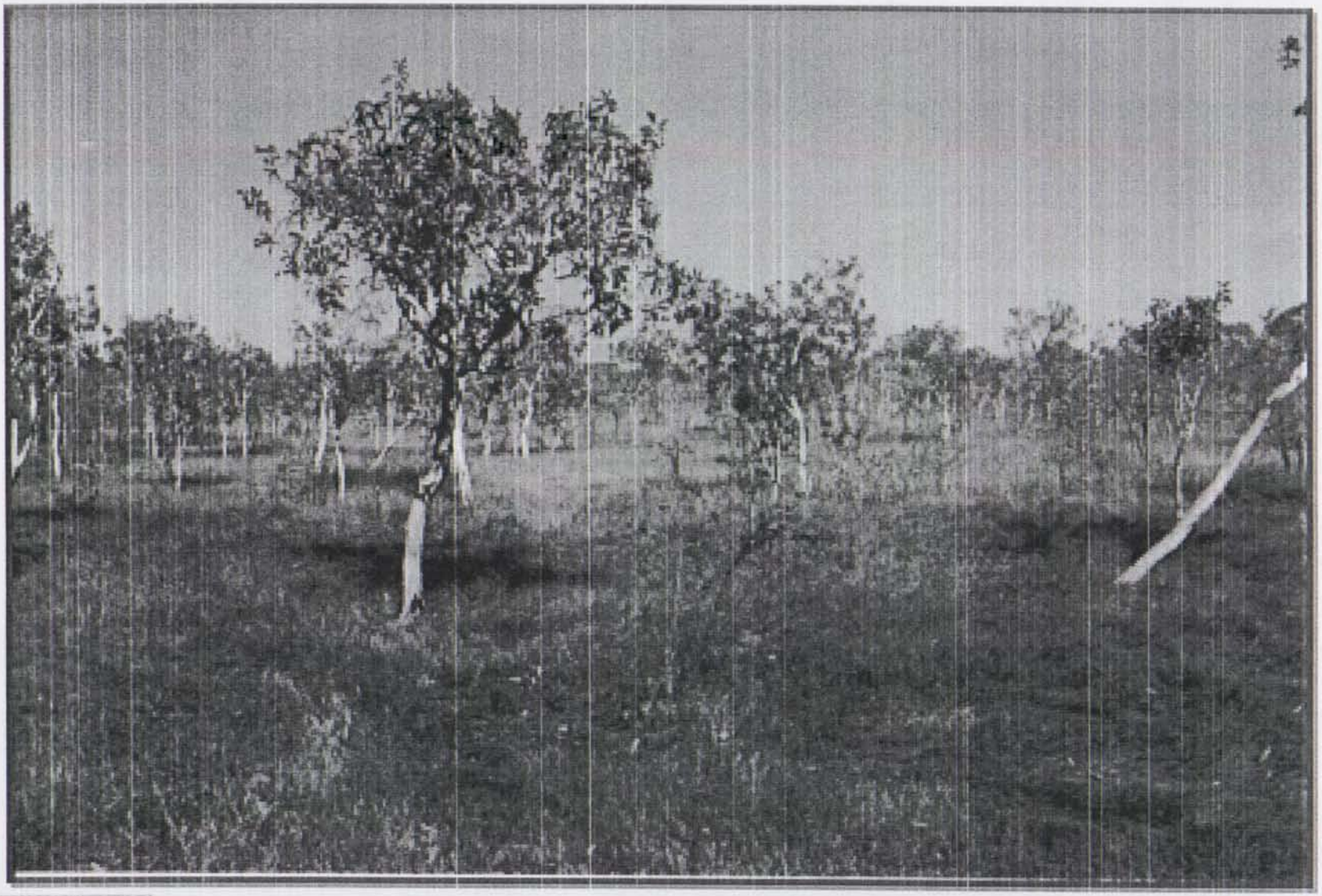
Landform		Water regime	Wetland class
Basic shape	**Distinguishing features**		
CHANNEL	Active drainage line	Permanently inundated	River
	Active drainage line	Seasonally inundated	Creek
	Pool in flow channel	Permanently inundated	Channel billabong
	Off-channel pool with connection to flow channel	Permanently inundated	Backflow billabong
	Off-channel pool with no connection to flow channel	Permanently inundated	Floodplain billabong
FLAT	Well defined margins	Seasonally inundated	Floodplain
	Ill-defined margins	Seasonally waterlogged	Dampland
BASIN	Depression on floodplain	Seasonally inundated	Sumpland
	Depression in non-floodplain setting	Permanently inundated	Waterhole
	Depression in non-floodplain setting	Seasonally inundated	Sinkhole or doline

River



Floodplain

Dampland

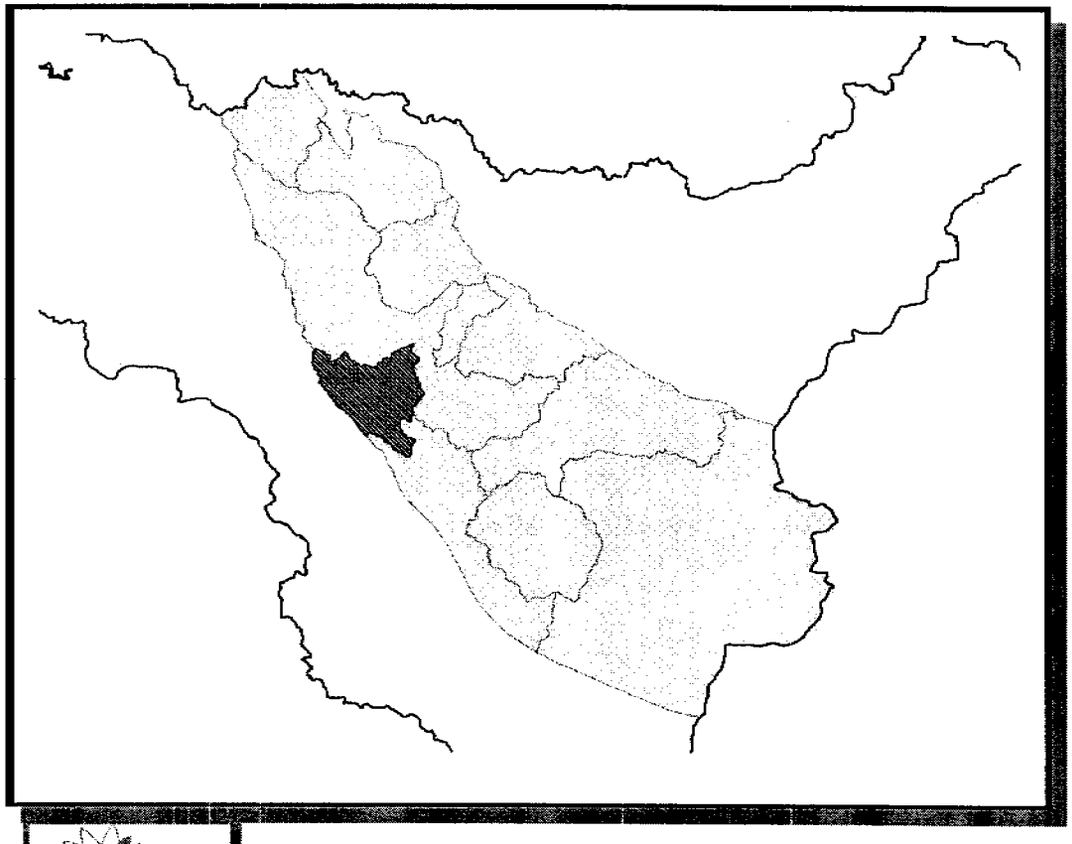


Waterhole

Sumpland

Table 4: Overview of the extent of the major wetland types in the Daly Basin

Basin Component	Floodplain (km^2)	Dampland (km^2)	River/Creek channels (km)
Daly	605	416	5 023
Green Ant	153	166	1 425
Douglas	183	210	905
Stray	75	77	839
Dead Horse	11	48	398
Fergusson	95	89	1 620
Katherine	370	118	3 758
King and Dry	304	171	5 157
Limestone	86	84	2 431
Flora	63	102	2 484
Bradshaw	65	43	1 520
TOTAL	2 010	1 524	25 560



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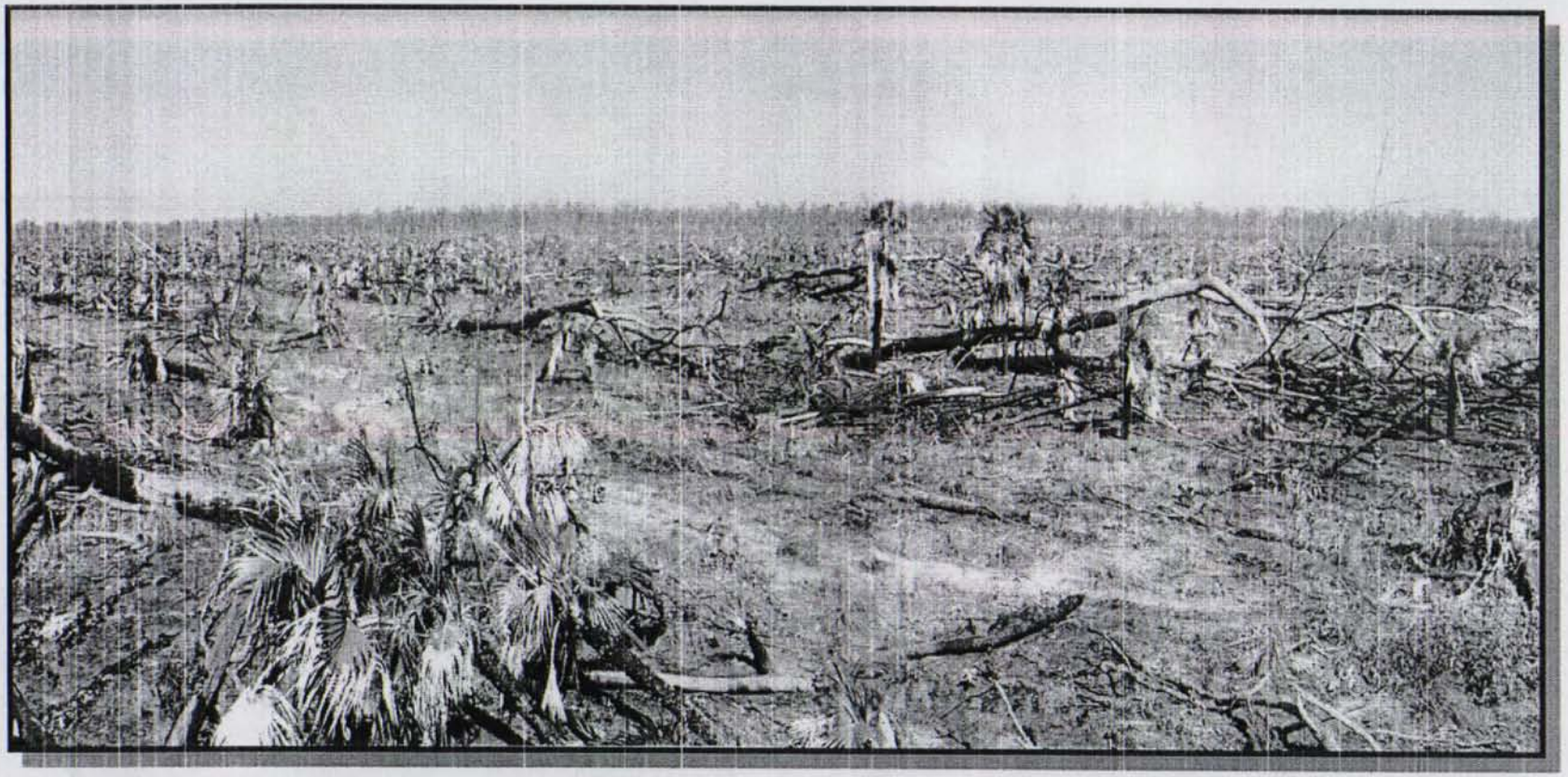
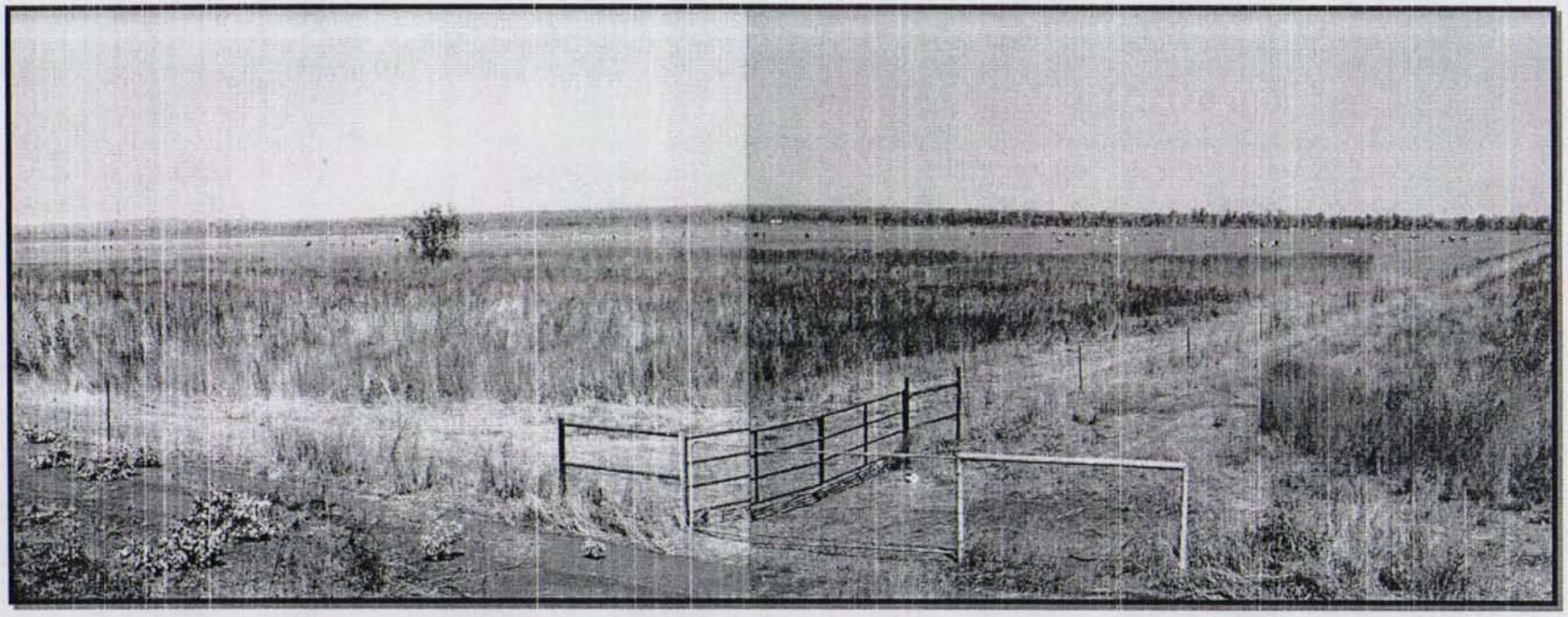
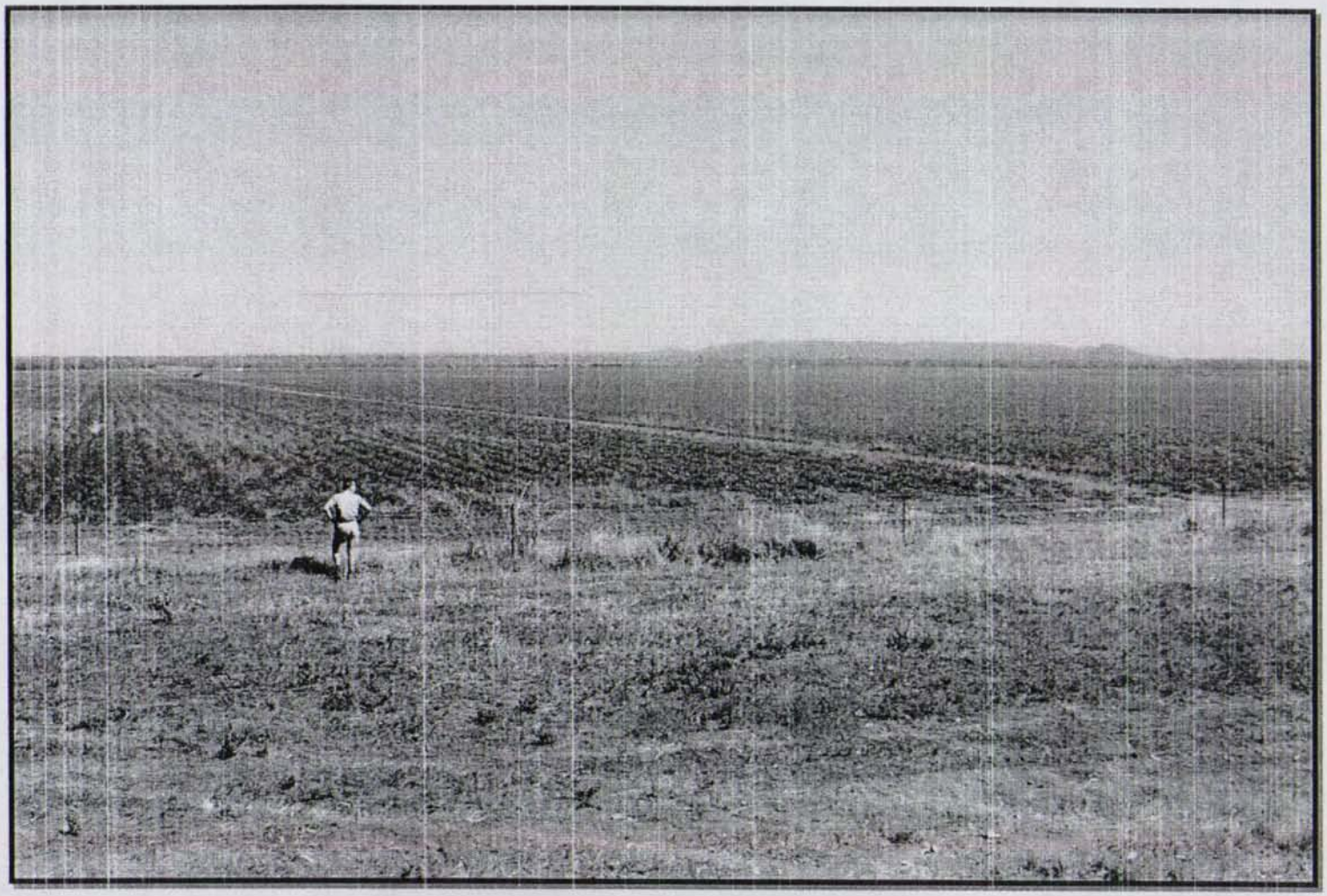
THREATS : Clearing



Improved Pasture

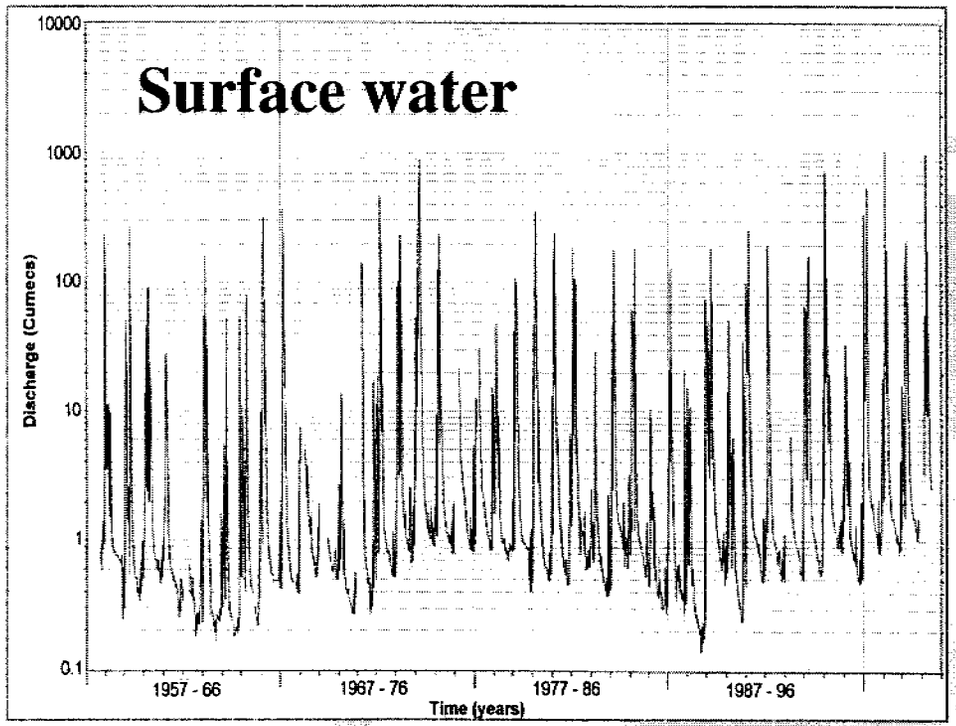


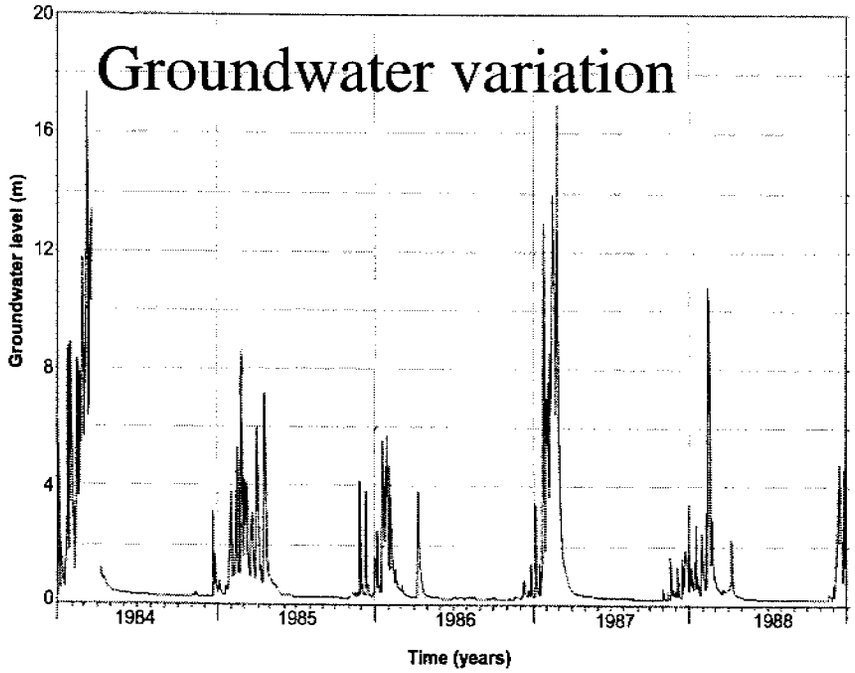
Irrigation



Road Construction

Hydrology


Surface water
Discharge (Cumecs)
10000
1000
100
10
1
0.1
1957 - 66
1967 - 76
1977 - 86
1987 - 96
Time (years)


Groundwater variation
Groundwater level (m)
20
16
12
8
4
0
1984
1985
1986
1987
1988
Time (years)

Risk Assessment of land & water use to wetlands of the Daly basin

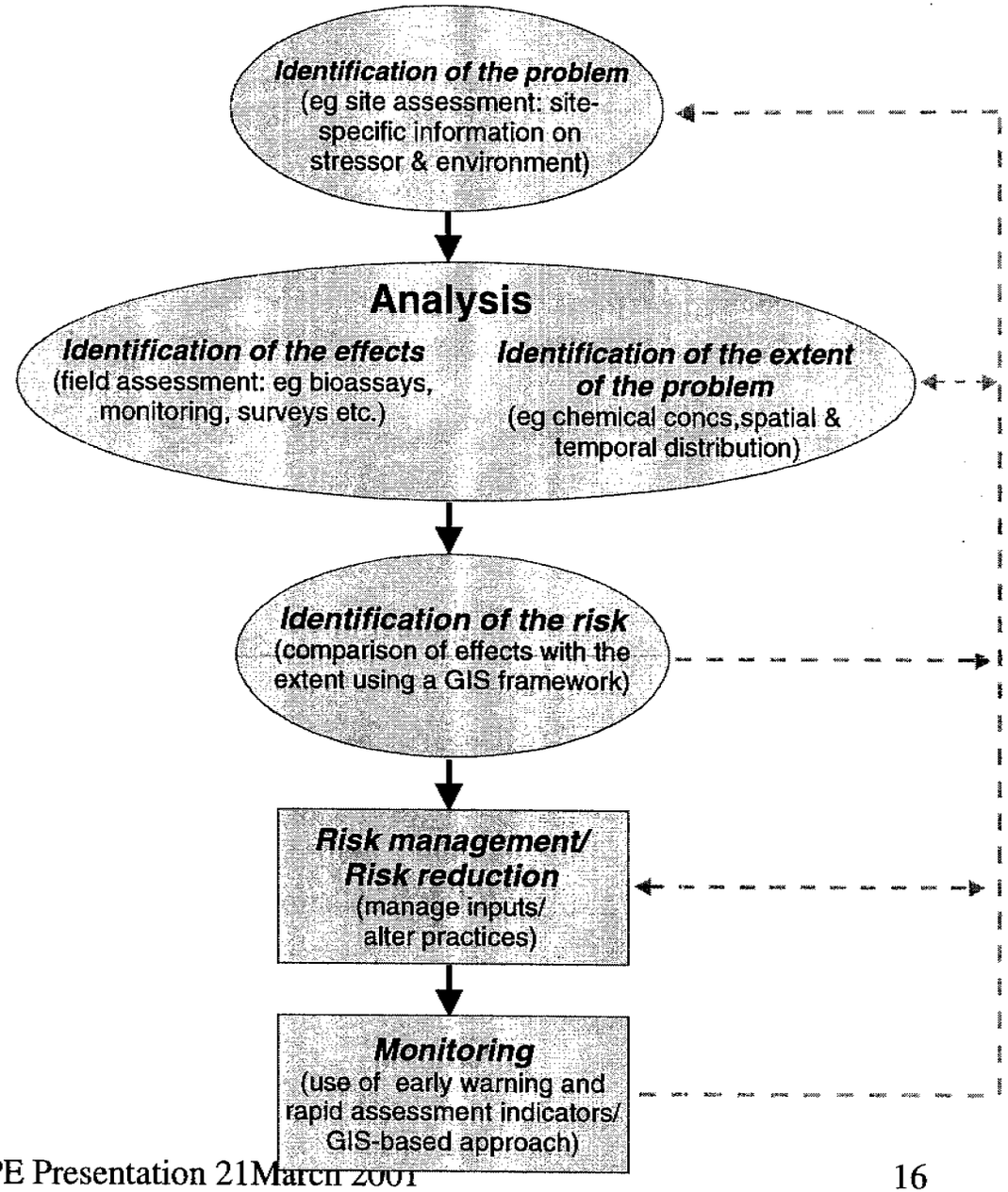
Objectives

- To predict the land/water uses that pose the most risk to the wetlands in terms of altering their water regime;

- To predict the types and extent of wetlands at most risk of experiencing altered water regime.

The Risk Assessment Framework

(modified from van Dam *et al.* 1999; Ramsar 2000)



Potential effects of land & water use

Over-arching threats to the wetlands:

- Land use activities

Associated threats most likely to affect water regime:

- Water abstraction (ground & surface water)
- Water impoundment
- Land clearance (& development)

Potential extent of land & water use

2025 scenario:

- **Low potential agriculture - 48%**
  (9390 km^2; mostly pastoral + some mixed arable farming)
- **Pastoral - 26%** (5140 km^2; pastoral only)
- **High potential agriculture - 9%**
  (1750 km^2; mixed arable farming + improved pastures)
- **Conservation/open space - 8%** (1630 km^2)
- **Urban development - 2%** (410 km^2; Katherine, proposed town of Fleming)
- **Others - ~7%** (Mining, tourism, defence, aboriginal land)

Identification of risks

Three-fold approach:

1. Use of the GIS and other information on land uses to determine the activities that pose the greatest risk to the wetlands

2. Use of the GIS to identify the wetlands within the major land uses, and determine the wetlands most at risk

3. Further discussing regions/activities of particular concern

Identification of risks

Land uses posing most risk

- Considered the potential impact of land use on water regime:

  - surface water extraction
  - ground water extraction
  - water impoundment
  - land clearance/development

- Ranked the magnitude of the threats for each land use:

  0 - Nil; 1 - Low; 2 - Moderate; 3 - High

- Considered the extent of land uses in the Daly basin where necessary

Identification of risks
Land uses posing most risk

Risk ranking of major land uses

Land use	Magnitude of major threats				Total (ranking)
	Surface water extraction	G'water extraction	Water impoundment	Land clearance/ development	
High potential agriculture	2	3	3	2	**10** (1)
Urban devt.	2	2	1	3	**8** (2)
Low potential agriculture	1	2	2	1	**6** (3)
Pastoralism	1	1	1	1	**4** (4)
Mining	0	1	1	2	**4**

Identification of risks
Wetlands at most risk

- Use of the GIS: *wetland types + land use*

- Focus on major wetland types:
  - floodplains (2000 km^2)
  - damplands (1500 km^2)
  - river channels (750 km)
  - seasonal creeks (25,000 km)

- Estimated area of major wetland types existing within the various land uses

- Assigned risks to wetlands according to the relative risk of the land use

Identification of risks
Wetlands at most risk

Extent of major wetland types existing within projected land uses

	% of wetland within land use			
Land use	**Floodplain**	**Dampland**	**River**	**Creek**
High potential agriculture	**8**	**10**	**<1**	**6**
Urban devt.	**2**	**5**	**5**	**4**
Low potential agriculture	**47**	**52**	**8**	**39**
Pastoral	**22**	**13**	**31**	**37**
Conservation	**16**	**13**	**55**	**14**

Identification of risks
Wetlands at most risk

Assigning risks to wetlands:

Water extraction & land clearance

Likely: wetlands within High potential agriculture land & urban land

Possible: wetlands within Low potential agricultural land

Unlikely: wetlands within pastoral land & other, minor land uses

Very unlikely: wetlands within conservation areas

Water impoundment

Likely: wetlands within dammed catchments that are dependent on channel flows

Possible: wetlands within Daly River catchment that are dependent on channel flows

Unlikely: wetlands indpendent of channel flows

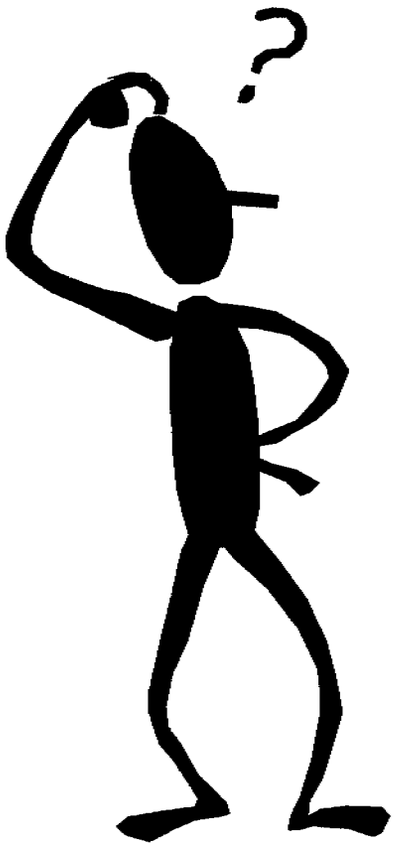
Identification of risks
Wetlands at most risk

Threat	Wetland type	% of wetland			
		Likely	Possible	Unlikely	Very unlikely
Water extraction & land clearance	Floodplain	10	47	27	16
	Dampland	15	52	20	13
	River	5	8	32	55
	Creek	10	39	37	14
Water impound-ment	Floodplain	24	27	49	
	Dampland	0	0	100	
	River	18	26	56	
	Creek	<1	0	100	

Identification of risks
Summary

- The Douglas, Stray, Fergusson & Katherine catchments, and their associated land uses represent most future concern
- Damming, if it proceeds, will be the biggest threat to the water regime of the major wetlands
- It is *likely* that 5 to 15% of each of the major wetlands will experience altered water regime (based on the 2025 scenario)
- It is *possible* that 10 to 50% of each of the major wetlands could experience altered water regime (based on the 2025 scenario)
- <20% of each of the major wetlands will be contained within conservation reserves

Information gaps



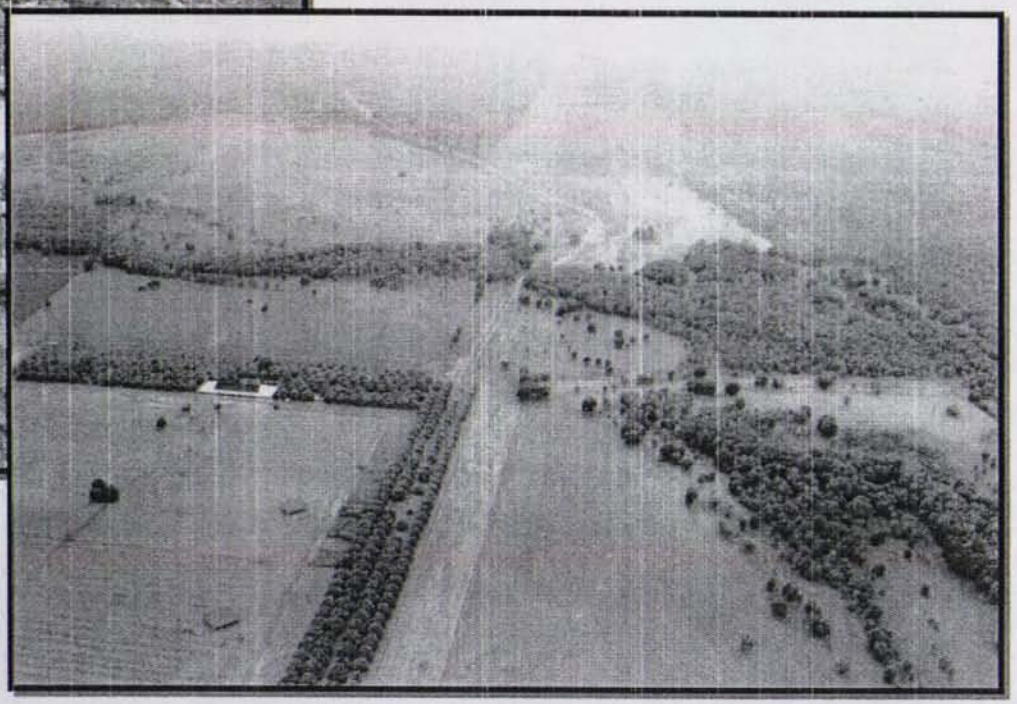
- Temporal information
- Soils coverage
- More precise land and water use data
- Topographic information
- Ecological characteristics
- Water regime requirements of wetland fauna and flora

Conclusions & recommendations

- Wetland resilience
- Beneficial use declaration

Conclusions & recommendations

- Integrated landuse planning
- Sustainable use



Conclusions & recommendations

- Wetlands outside basin
- Baseline monitoring