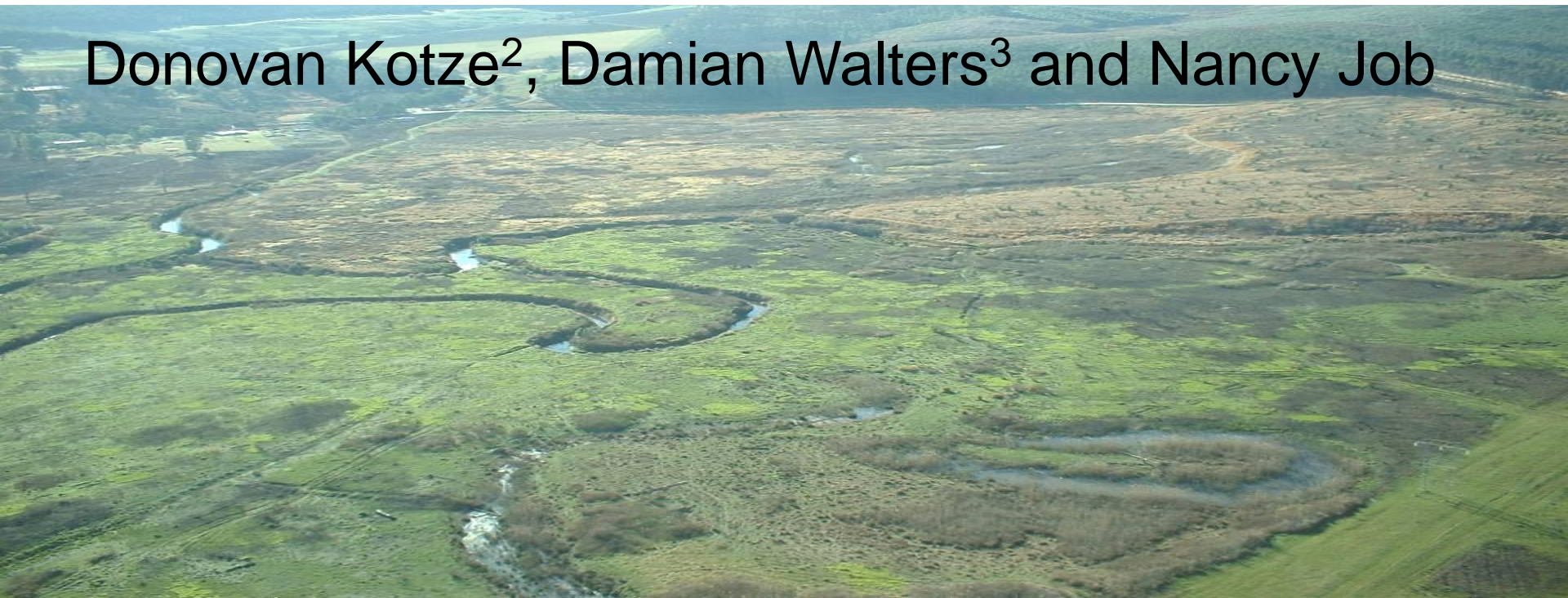# Application of WET-Health[1], an approach for assessing change in wetland condition

Donovan Kotze[2], Damian Walters[3] and Nancy Job

[1]MACFARLANE DM, KOTZE DC, ELLERY WN, WALTERS D, KOOPMAN V, GOODMAN P and GOGE M. 2008. *WET-Health: A technique for rapidly assessing wetland health.* WRC Report No. TT 340/08. Water Research Commission, Pretoria.

[2] UNIVERSITY OF KWAZULU-NATAL

[3] mondi Wetlands programme · WESSA PEOPLE CARING FOR THE EARTH · WWF

Water Research Commission

The challenge

A considerable diversity of wetlands - the template that shapes wetlands (geology, terrain and climate) varies greatly across the country

Human influences on wetlands **also vary greatly -** highly industrialized & subsistence situations

How is this to be accounted for in the assessment of wetland condition?
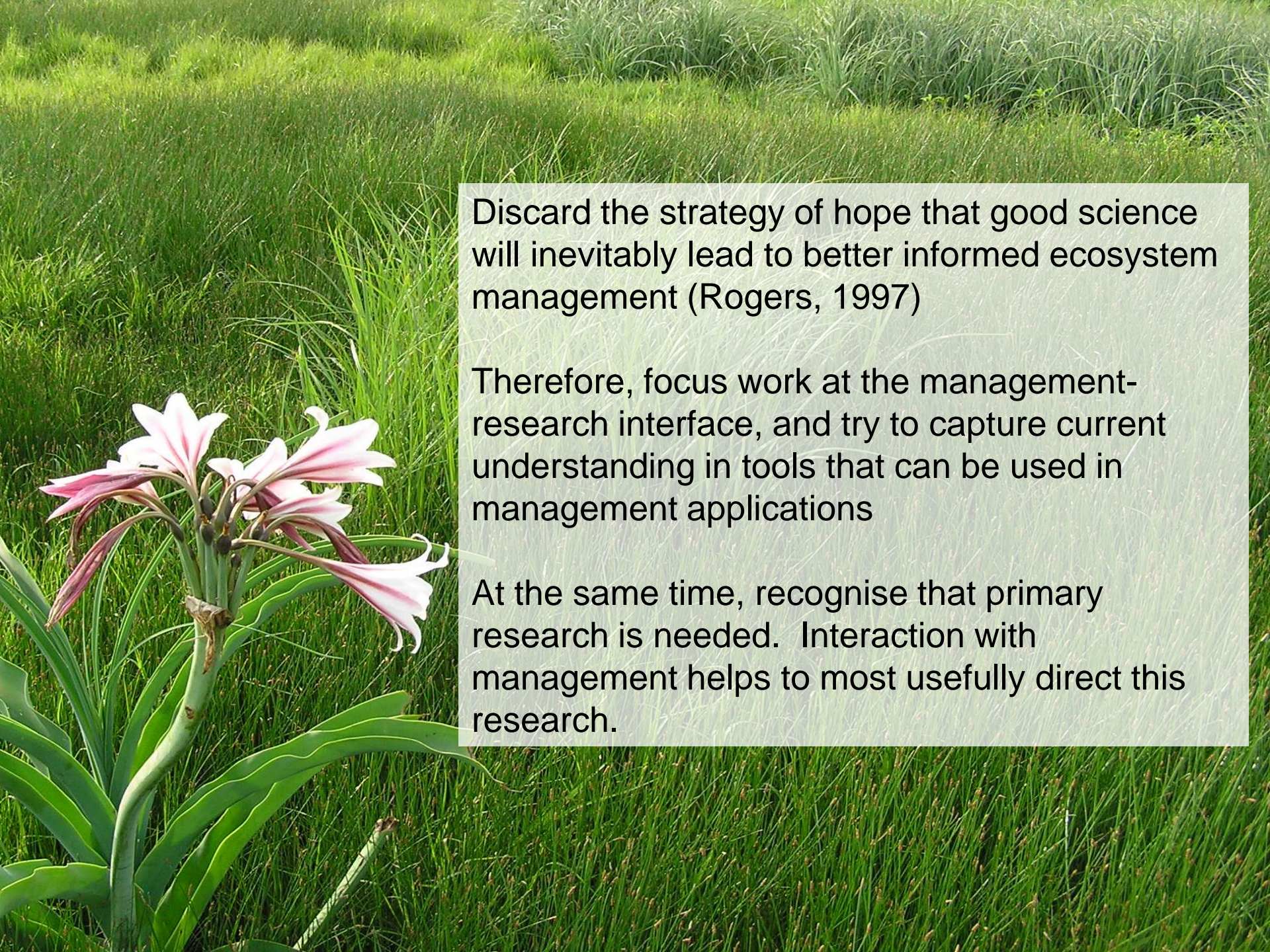
Discard the strategy of hope that good science will inevitably lead to better informed ecosystem management (Rogers, 1997)

Therefore, focus work at the management-research interface, and try to capture current understanding in tools that can be used in management applications

At the same time, recognise that primary research is needed. Interaction with management helps to most usefully direct this research.

Purpose of the presentation: briefly describe WET-Health, drawing on two examples where WET-Health has been applied

Stewardship
programme
with livestock farmers
in the Kamiesberg,
Northern Cape

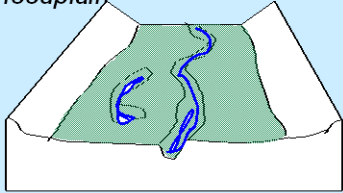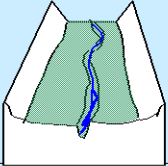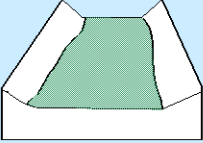
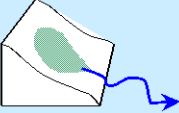In collaboration with
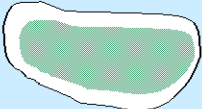Conservation International

Mondi's state of
wetlands report,
Mpumalanga Province
and KwaZulu-Natal

In collaboration
with Mondi

Characterise the wetland and its setting

1. Hydro-geomorphological type/s

Hydro-geomorphic types	Description
Floodplain	Valley bottom, Stream channel, Gently sloped. Alluvial, floodplain features (e.g. oxbow)
Valley bottom with a channel	Valley bottom, stream channel, Alluvial, Water inputs from main channel (when channel banks overspill) and from adjacent slopes.
Valley bottom without a channel	Valley bottom, usu gently sloped, No clearly defined channel, Alluvial
Hillslope seepage feeding a watercourse	Hillslope, colluvial Inputs mainly subsurface Outflow is via a channel
Hillslope seepage not feeding a watercourse	Hillslope, colluvial Inputs mainly subsurface Outflow is limited
Depression (includes Pans)	Basin shaped, An outlet is usually absent.

2. Climatic setting of the wetland

e.g. Kamiesberg

Mean annual precipitation:
 240 mm

Mean annual potential evaporation:
2 290 mm

The approach used by WET-Health

Disaggregate wetland condition (health) into three main components:
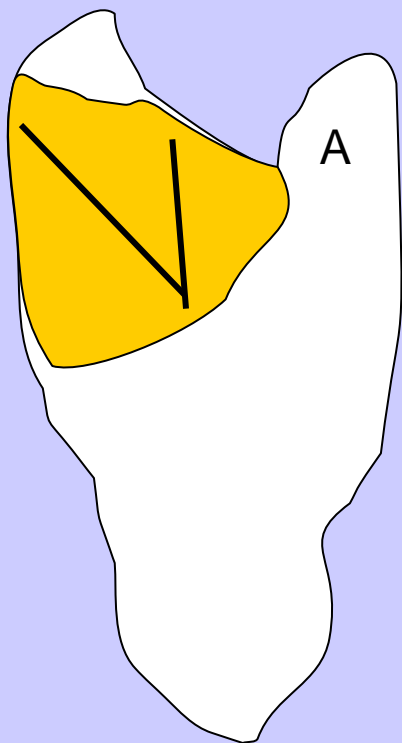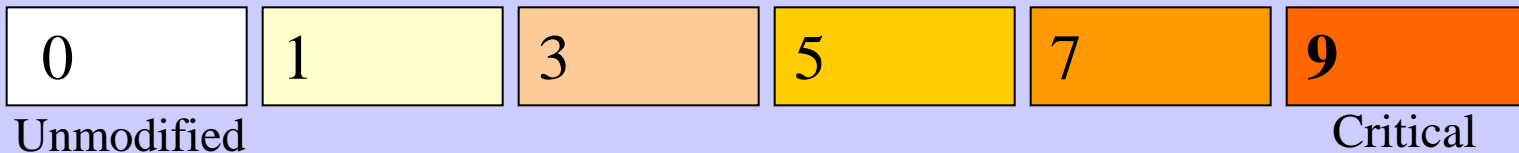
Hydrology

Geomorphology

Vegetation

For each of the three components examine impacts on wetland condition (from on-site and from the upstream catchment).

Extent affected (%/100) x Intensity (0 to 10) = **Magnitude of impact** on integrity (0 to 10)
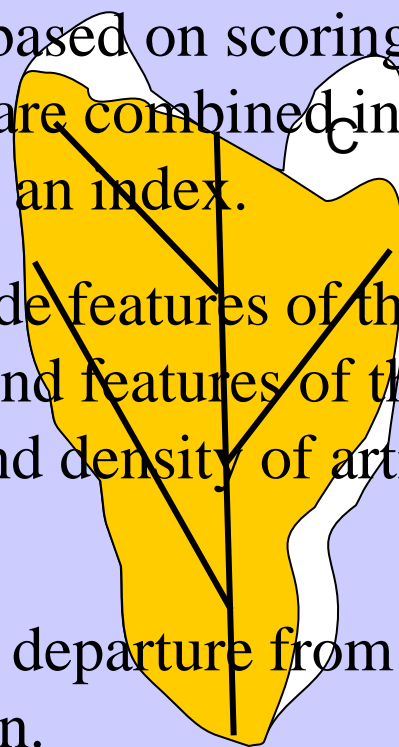
Impact:

0	1	3	5	7	**9**

Unmodified   Critical

Intensity is assessed based on scoring a set of descriptors which are combined into an algorithm to generate an index.

The descriptors include features of the wetland (e.g. slope) and features of the stressor (e.g. depth and density of artificial drains)

Reflects the extent of departure from an un-impacted condition.

A   B   C
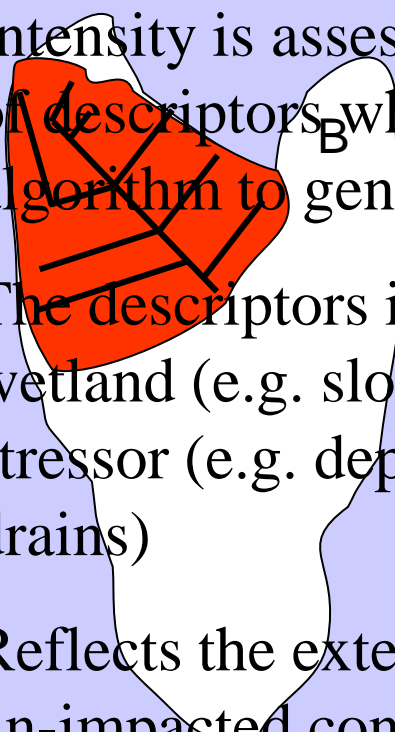
Magnitude of impact score:

30/100 x 5 = **1.5**   30/100 x 9 = **2.7**   80/100 x 5 = **4**

Current condition score = (10 – [Sum of impacts]):

A typical example from the Kamiesberg

Dense poplar stand

Artificially drained area

Near-natural area

Impacts

5/100 x 9 = **0.5**

30/100 x 5 = **1.5**

65/100 x 1 = **0.7**

Sum of Impacts: 2.7
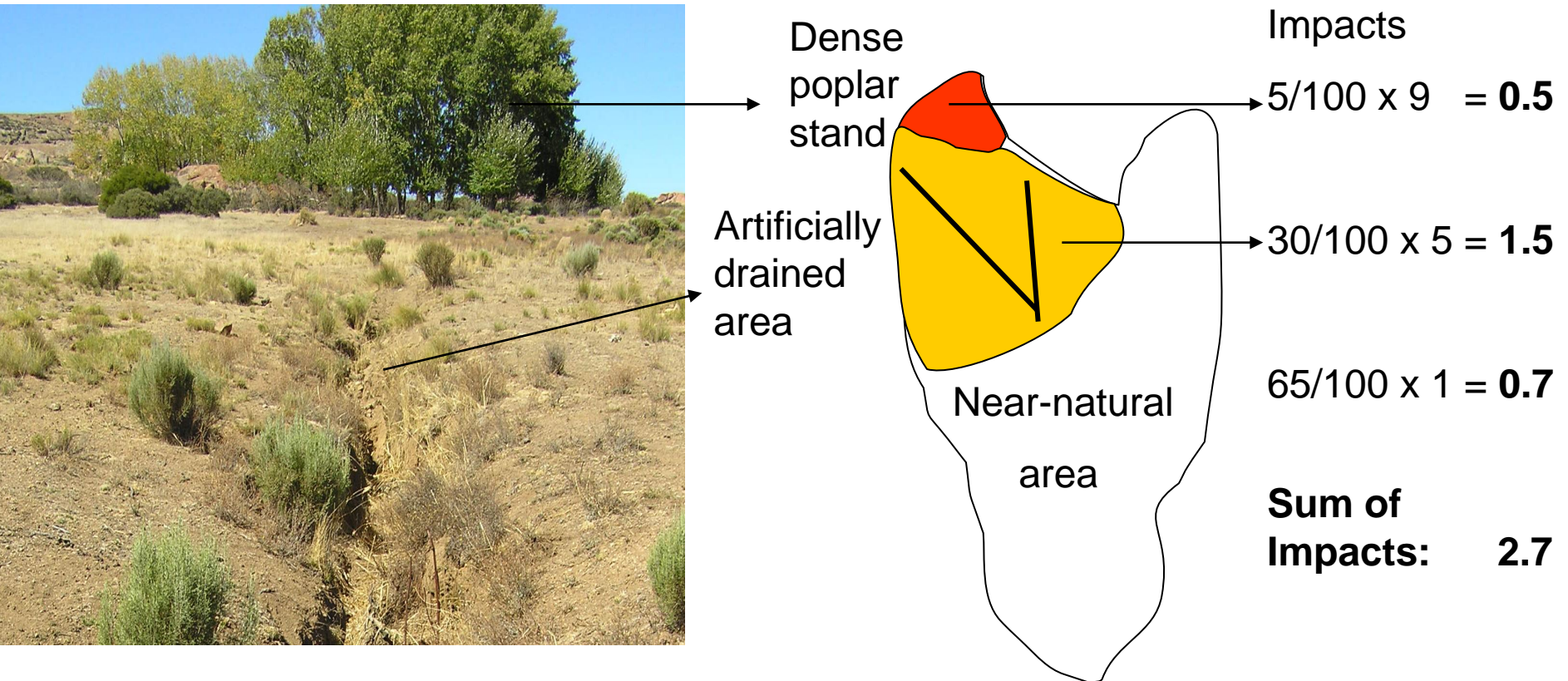
Current condition score: 10 – 2.7 = **7.3**

Condition scores and categories of Present Ecological Condition (used by Department of Water Affairs)

IMPACT CATEGORY	DESCRIPTION	CONDITION SCORE	PRESENT CONDITION CATEGORY
None	Unmodified, natural.	9.1- 10	A
Small	Largely natural with few modifications. A slight change in ecosystem processes is discernable and a small loss of natural habitats and biota may have taken place.	8.1- 9	B
Moderate	Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact	6.1- 8	C
Large	Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred.	4.1- 6	D
Serious	The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	2.1- 4	E
Critical	Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	0- 2	F

Anticipated trajectory of change in ecological condition over the next 10 years

↑↑	= Large improvement
↑	= Slight improvement
→	= Remain the same
↓	= Slight decline
↓↓	= Rapid decline

The typical example from the Kamiesberg

Slowly expanding poplar stand

Slight erosion anticipated in drainage channel

Therefore trajectory = ↓

Health class = C ↓

Summarized results from Mondi's state of the wetlands report

Management region	Wetland	Hydrology	Geomorphology	Vegetation
Midlands	Inverness	C ↑	A →	B →
	Homesdale	C →	A →	D →
	Nkonzo	D ↑	A →	E ↑
Zululand	Langepan	D →	A →	B ↓
	Kwambonambi Swamp Forest	D →	B →	B ↓
	Canewoods Valley	E →	A →	E ↑
	Canewoods Pan	E →	A →	F →
	Nyalzi Pan	D →	A →	D →
	Fernwoods Pan	D →	A →	E ↑
Northern KZN & Southern Mpumalanga	Brecher Salpine	D →	C →	D ↑
	Pivaanspoort	D →	B →	C ↑
	Zoar Vlei	D →	A →	C ↑
	Zoar Pan	D →	A →	A →
	Zandspruit	C ↓	A →	C →

WET-Health includes both stressor and response indicators

It is helpful in diagnosing specific stressors that are impacting upon ecological condition

This diagnosis is directly relevant to management.

Key general management issues revealed by Mondi's state of the wetlands report

Management region	Grazing pressure	Fire regime	Alien plants
Midlands	🙂 (orange, going well)	😐 (green, some impact)	🙁 (blue, significant)
Zululand coastal	🙂 (orange, going well)	🙁 (blue, significant)	🙂 (orange, going well)
Northern KZN and southern Mpumalanga	🙁 (blue, significant)	🙁 (blue, significant)	🙂 (orange, going well)

Legend:

🙁 (blue) = Significant impact. Significant management challenge.

😐 (green) = Some impact. Going reasonably, but room for improvement.

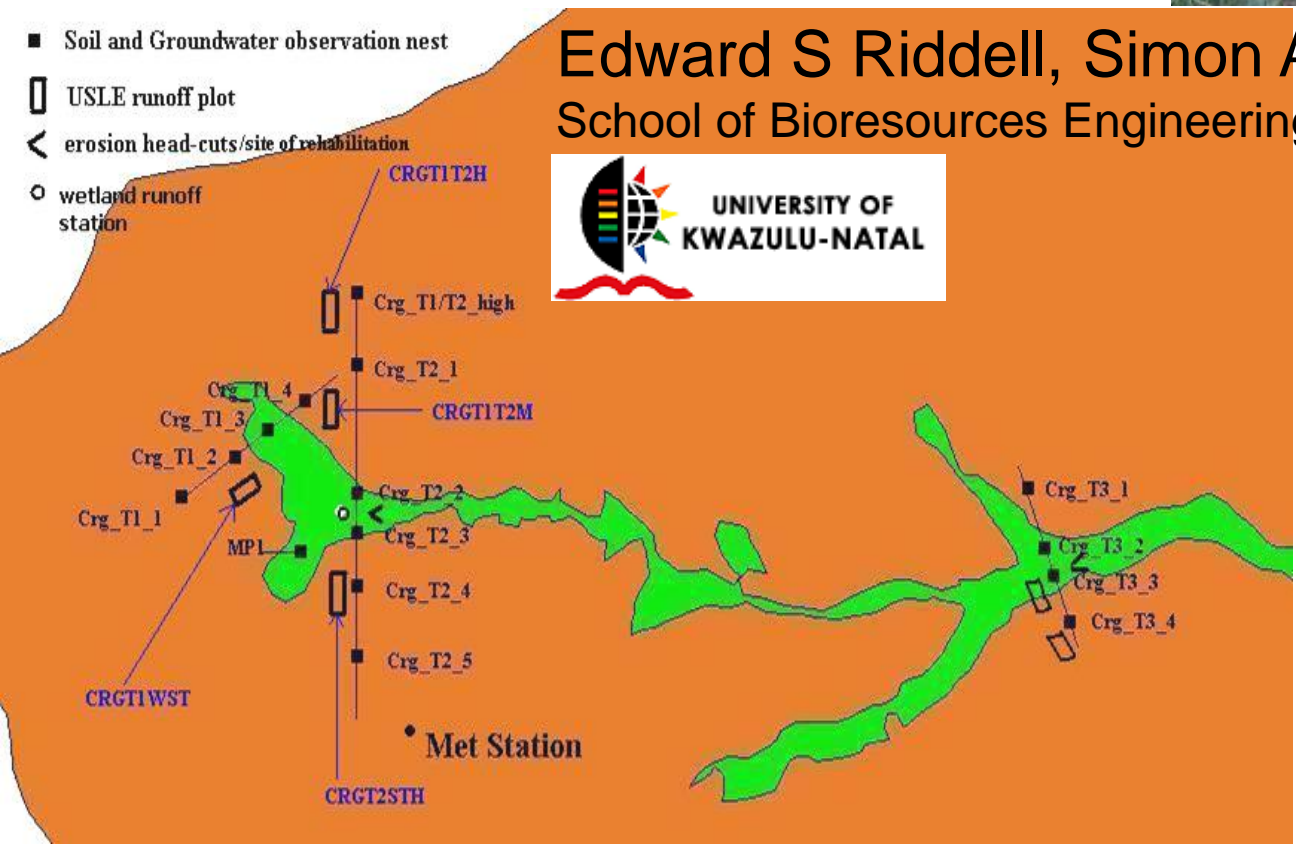🙂 (orange) = Relatively low impact, going well.

Conclusions

- The approaches and tools that we are using provide a more structured process to guide what we were previously doing more intuitively

- But now the assumptions & logic are much more explicit

- Challenged through application under new circumstances and through new primary research

An example:
A detailed hydrological investigation of the impact of gully erosion (and rehabilitation interventions) on the hydrology of a Severely Eroded Wetland System (Manalana, Craigieburn)

Edward S Riddell, Simon A Lorentz
School of Bioresources Engineering & Environmental Hydrology

UNIVERSITY OF KWAZULU-NATAL

- ■ Soil and Groundwater observation nest
- ▯ USLE runoff plot
- < erosion head-cuts/site of rehabilitation
- ○ wetland runoff station

CRGT1T2H
Crg_T1/T2_high
Crg_T2_1
CRGT1T2M
Crg_T1_4
Crg_T1_3
Crg_T1_2
Crg_T1_1
Crg_T2_2
Crg_T2_3
Crg_T3_1
Crg_T3_2
Crg_T3_3
Crg_T3_4
MP1
Crg_T2_4
Crg_T2_5
CRGT1WST
Met Station
CRGT2STH

clay layers
(aquitards)