

Linking land management to sub-surface water quality

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Wet Tropics



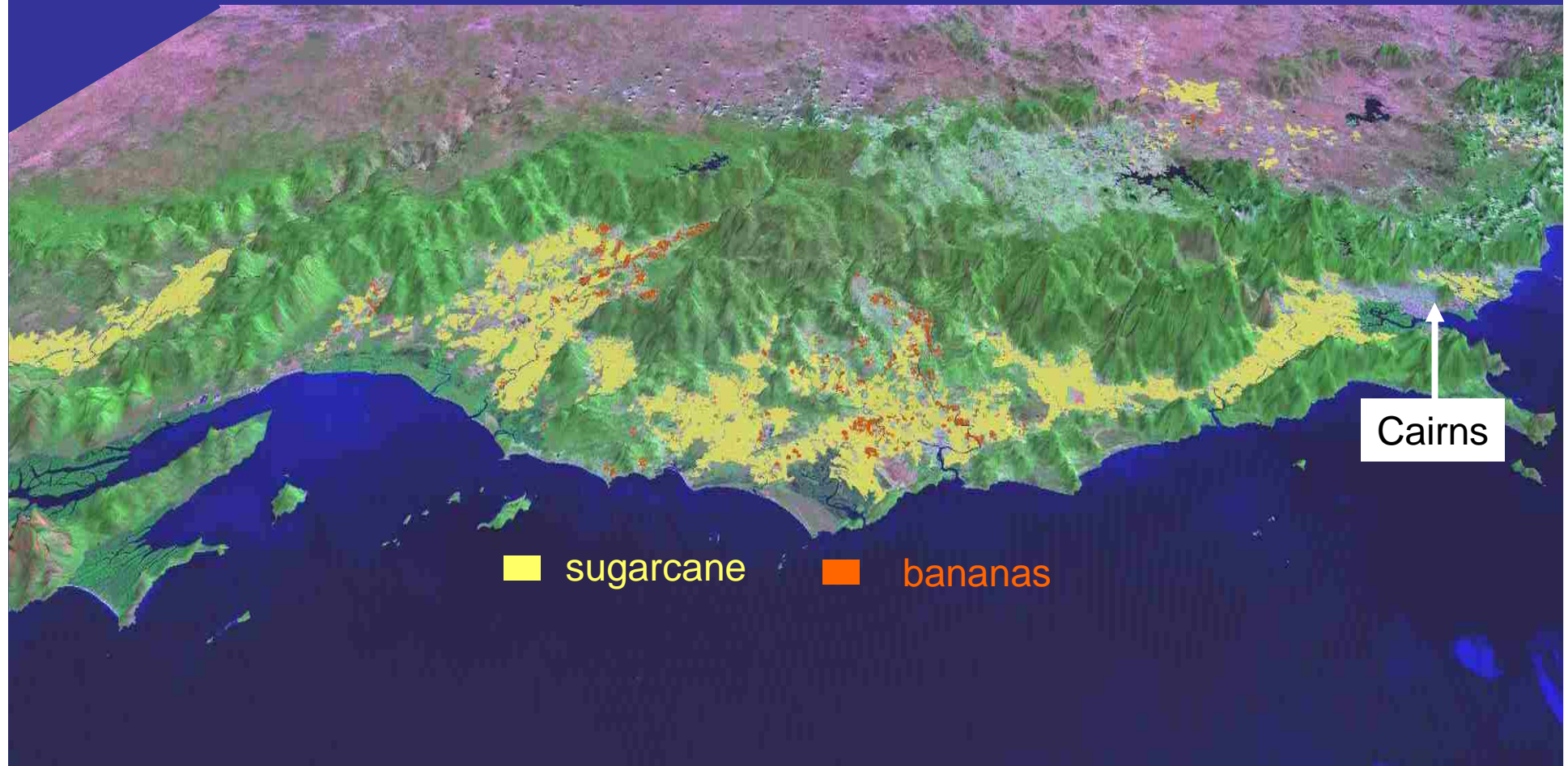
Tully

Innisfail

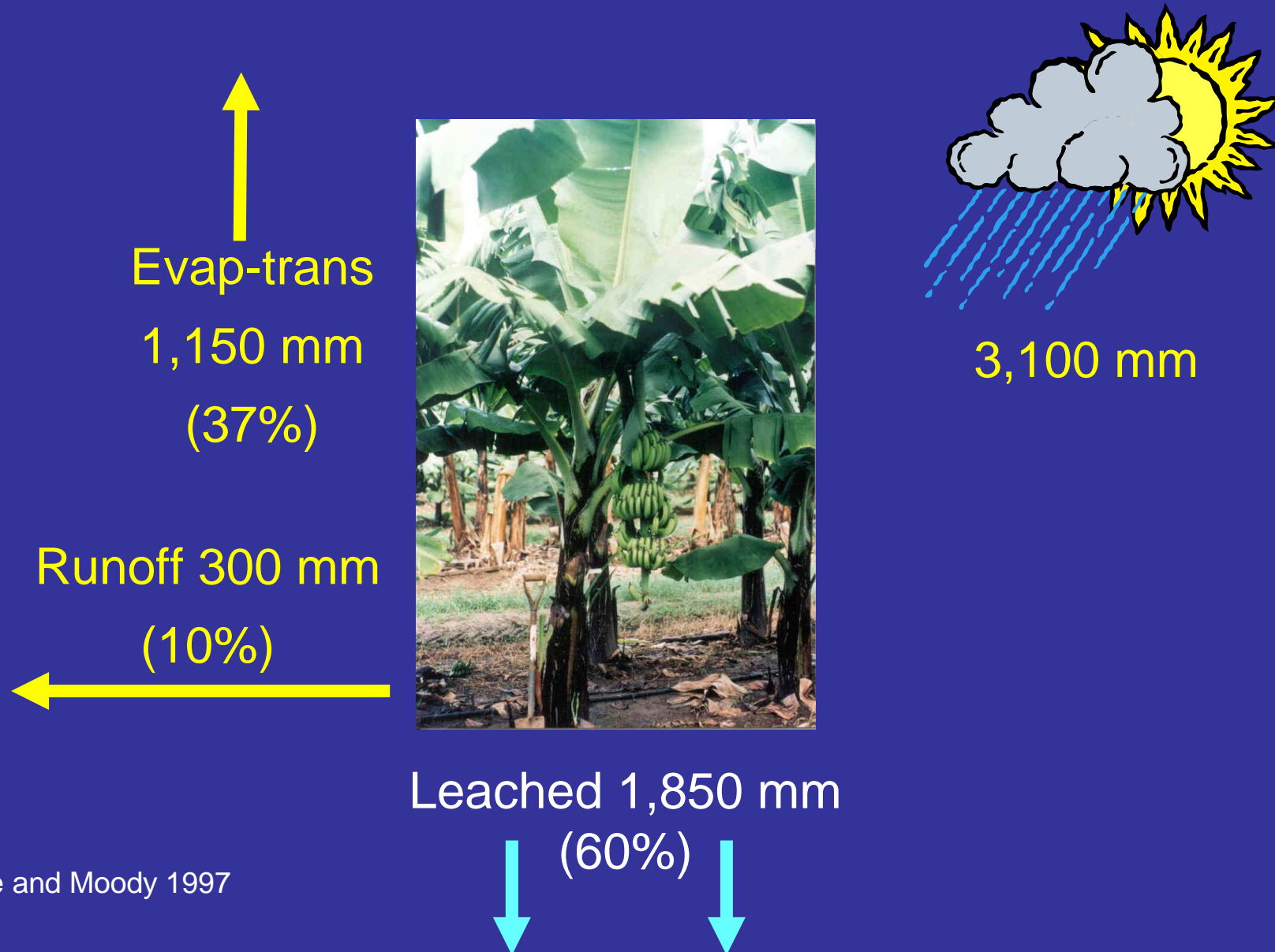
Cairns

Great Barrier Reef

Intensive cropping in wet tropics



Water balance in well drained soil



Prove and Moody 1997

Nitrogen balance (kg/ha) in plant crop

Bunches 30

Fertiliser 255

Runoff <2



Leached 150

Prove and Moody 1997



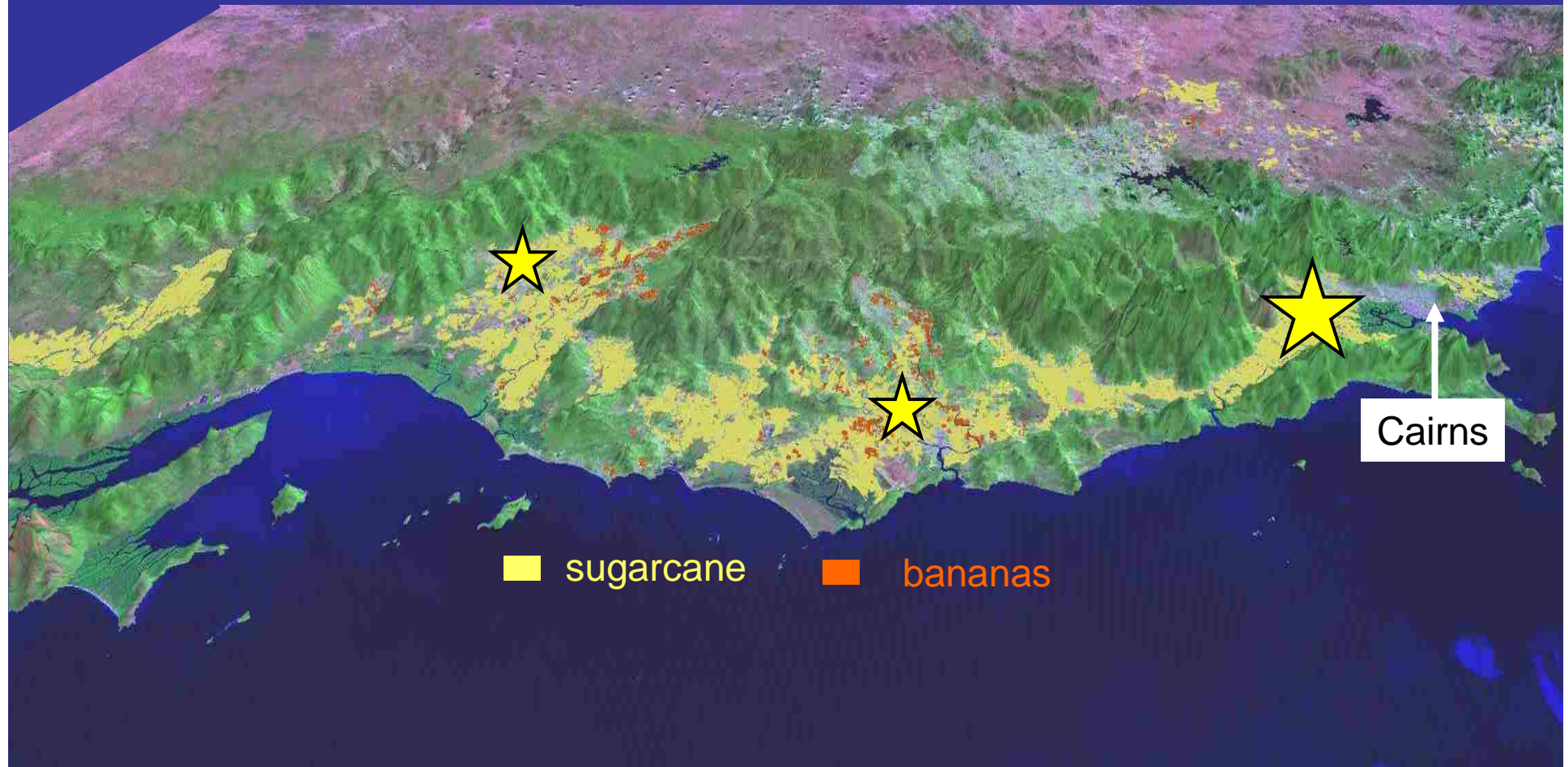
Herbicide movement after 50 mm rain



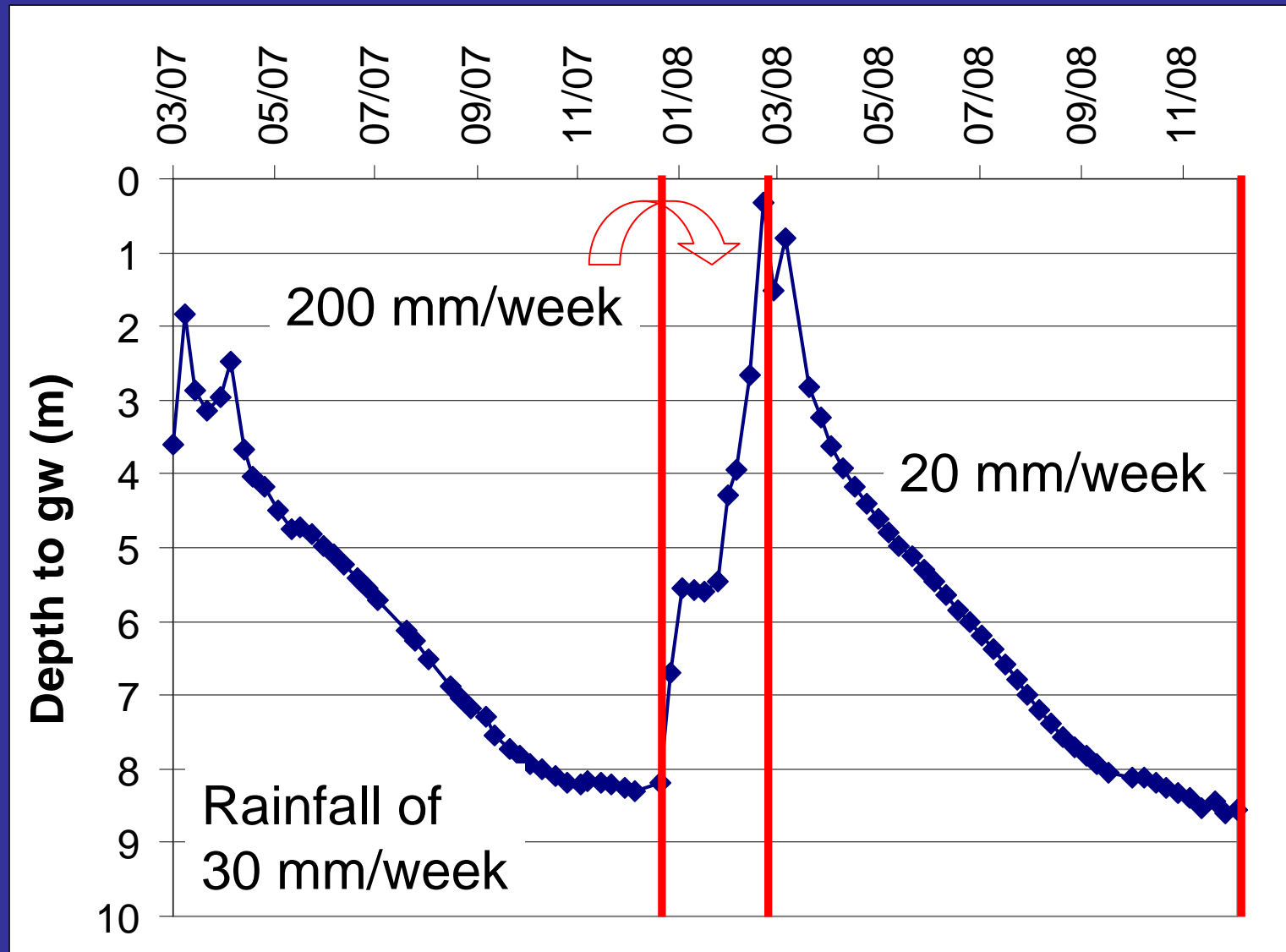
In runoff
Atrazine 90 g/ha
Diuron 70 g/ha

In soil profile (0-450 mm):
Atrazine 280 g/ha
Diuron 280 g/ha

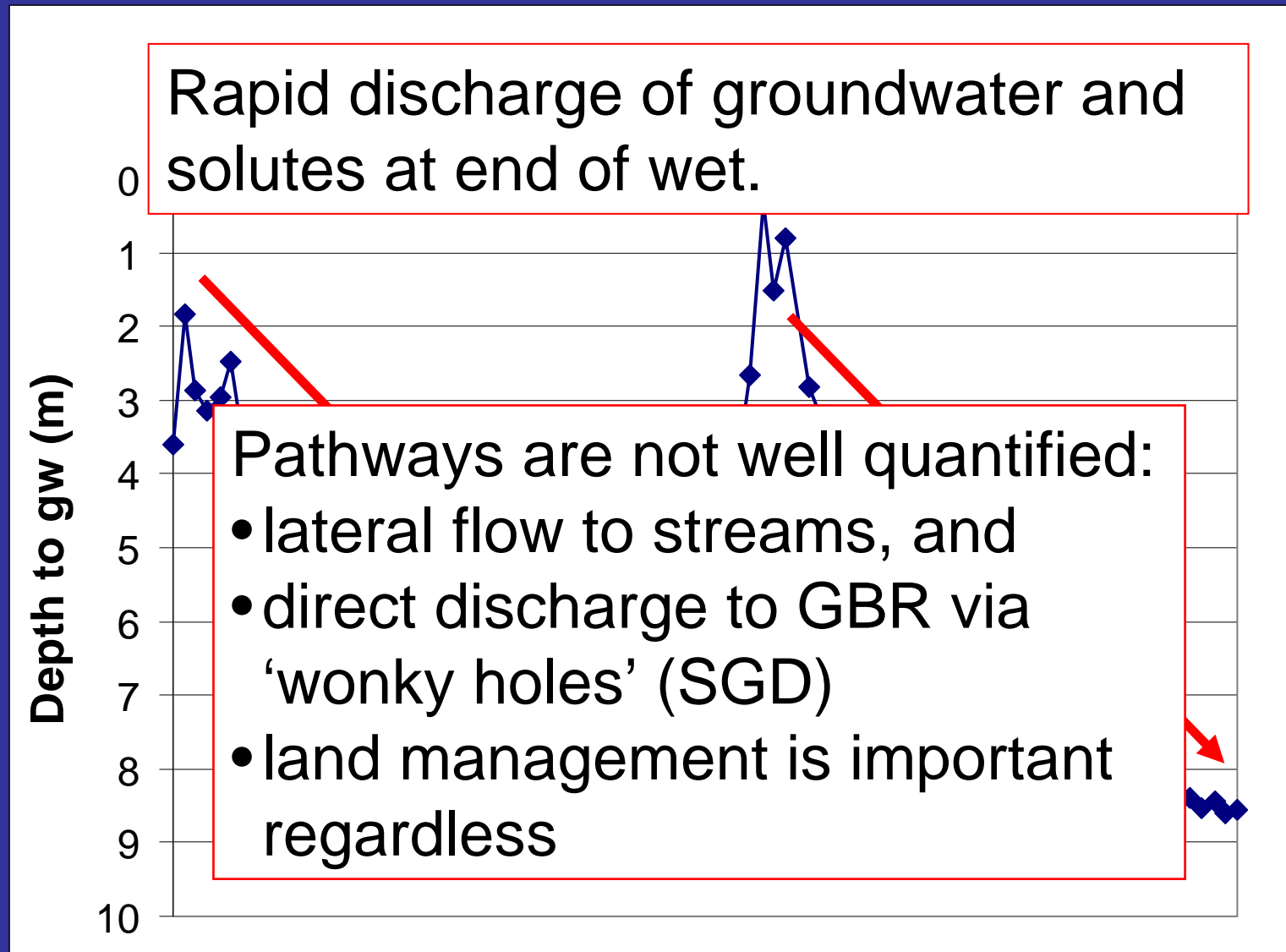
Root zone and groundwater studies



Groundwater dynamics - Gordonvale



Groundwater dynamics - Gordonvale



Management - trends in fertiliser use for bananas over time

	1995	2007
N (kg/ha/yr)	520	310 ratoon 260 plant

250 is desired target

- 40% reduction in N use for ratoon crops from research, development and extension (and higher fertiliser costs!)
- water quality impacts are uncertain

Management - trends in fertiliser use for bananas over time

	1995	2007
N (kg/ha/yr)	520	310 ratoon 260 plant
P (kg/ha/yr)	68	72

P use unchanged in absence of R, D & E
Luxury application rates often used

Management options to reduce offsite impacts

Sugarcane

- more than 2 N fertiliser applications per year currently uneconomic
- can avoid use of persistent residual herbicides e.g. use knock downs in weed control program

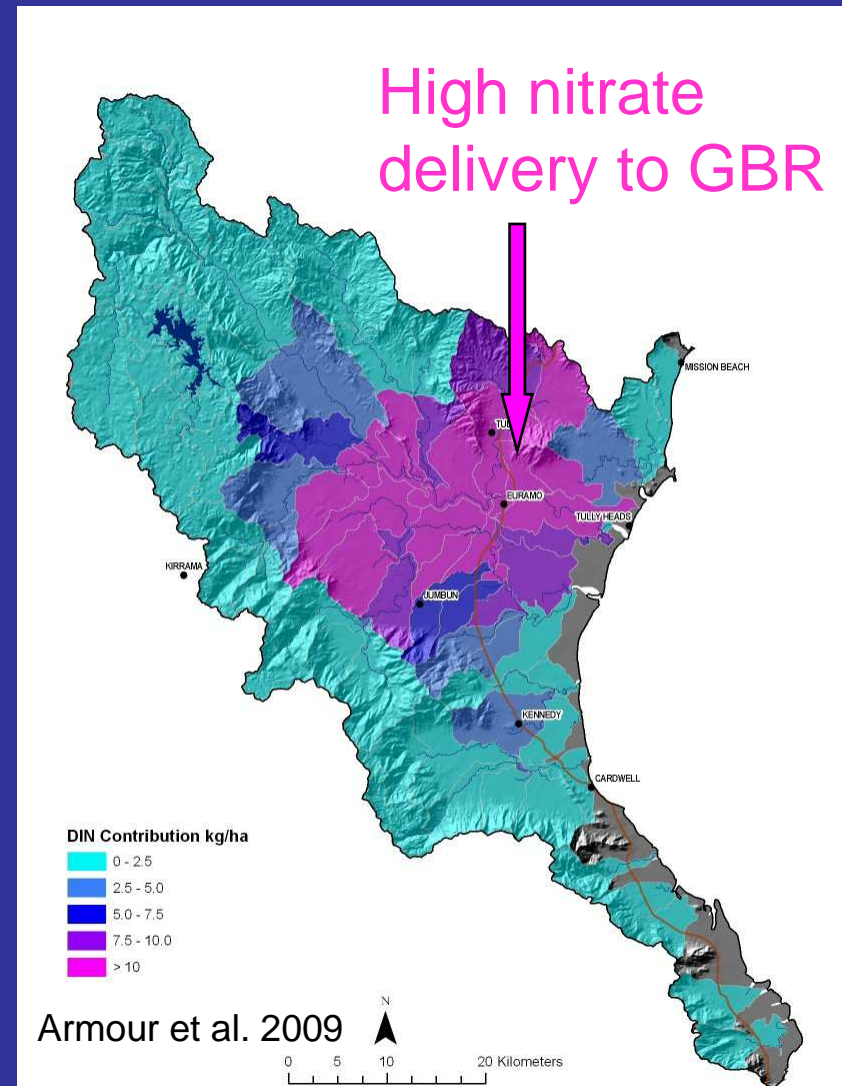
Management options to reduce offsite impacts

Bananas

- always irrigated → fertigation systems can deliver precise doses at low cost
- theoretically deliver N to match crop demand
- persistent herbicides not used

Catchment modelling and targets for sugarcane (Tully catchment)

- improved N management could reduce nitrate loads by **29%**
- but, **80%** reduction in nitrate discharge needed to meet marine nitrate targets



Conclusions

Improved water quality from land management

- control of contaminant movement is a major challenge due to hydrology
- agricultural industries have demonstrated improvements, but
- major effect needed with N management, especially sugarcane due to area
- What about likely yield penalties with lower N?