

# Creating Resilient Catchments in the Wheatbelt

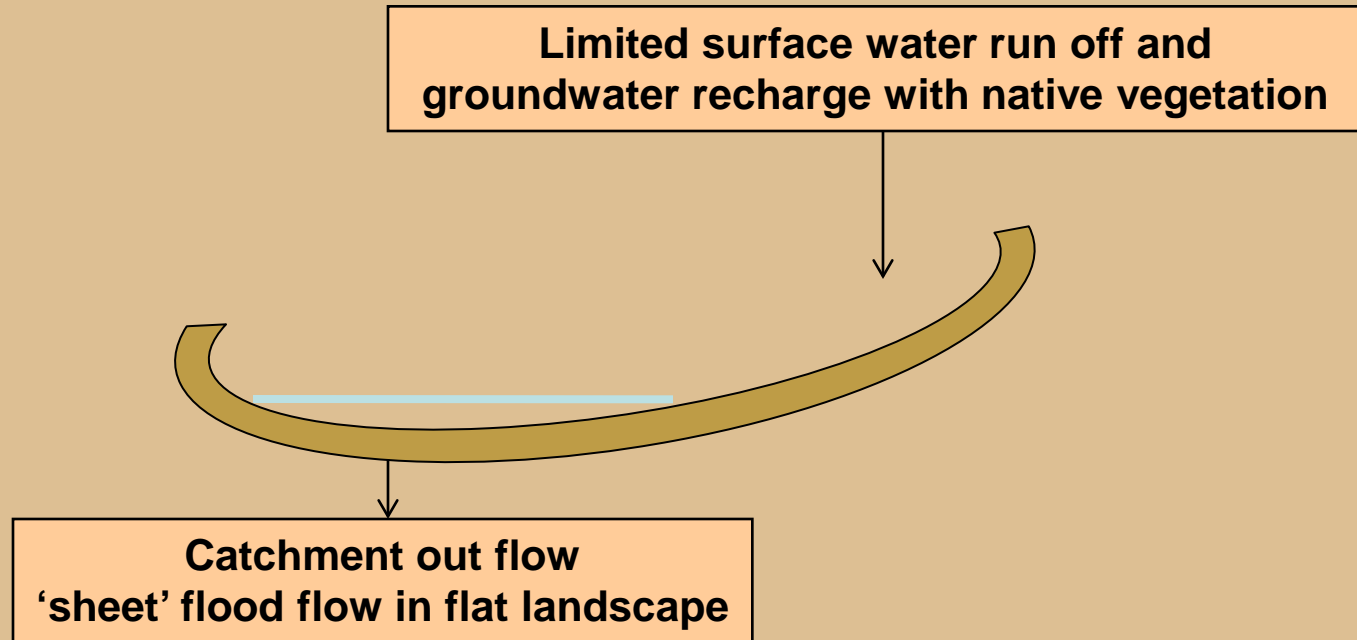
*‘working locally, utilise catchment wide water management to retard land degradation, enhance biodiversity, improve soil retention and increase crop productivity’*

# The community wants a sensible story..

- Land degradation addressed
  - Repeatable processes
  - Readily understood
  - No damage to others
  - Doesn't cost the earth and makes sense
- Commercially viable diverse incomes
- Healthy rural communities
- Government action not studies

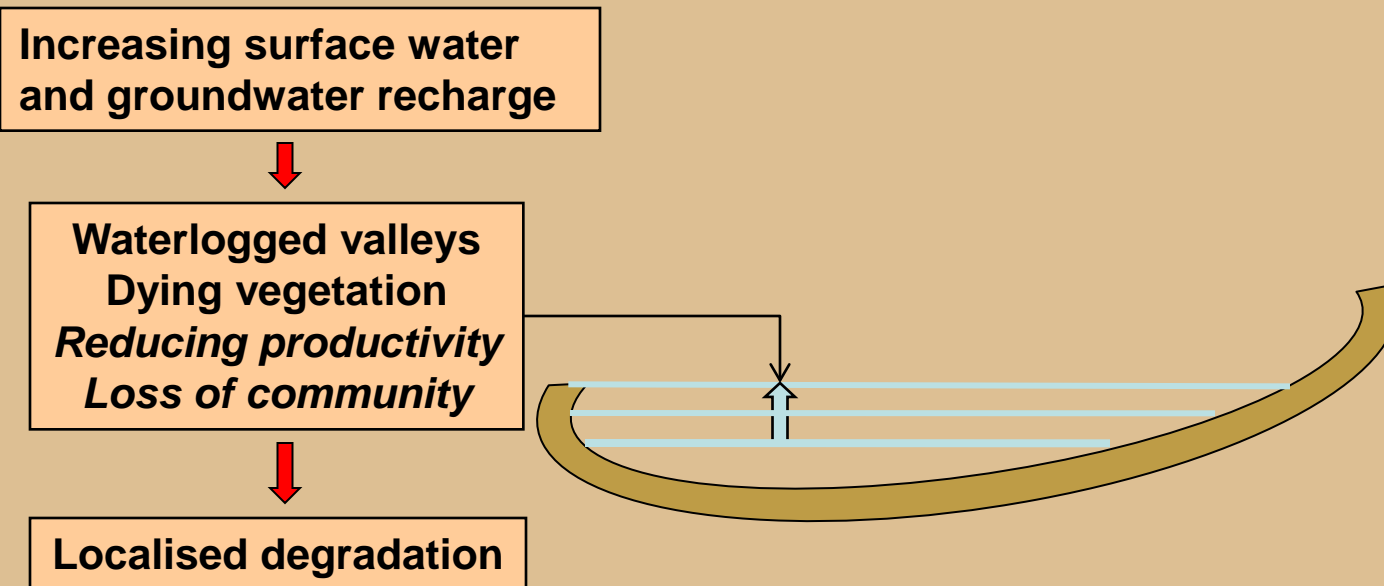
*'underlying need for long term food security for Australia'*

# View the Wheatbelt as a bathtub....1900's



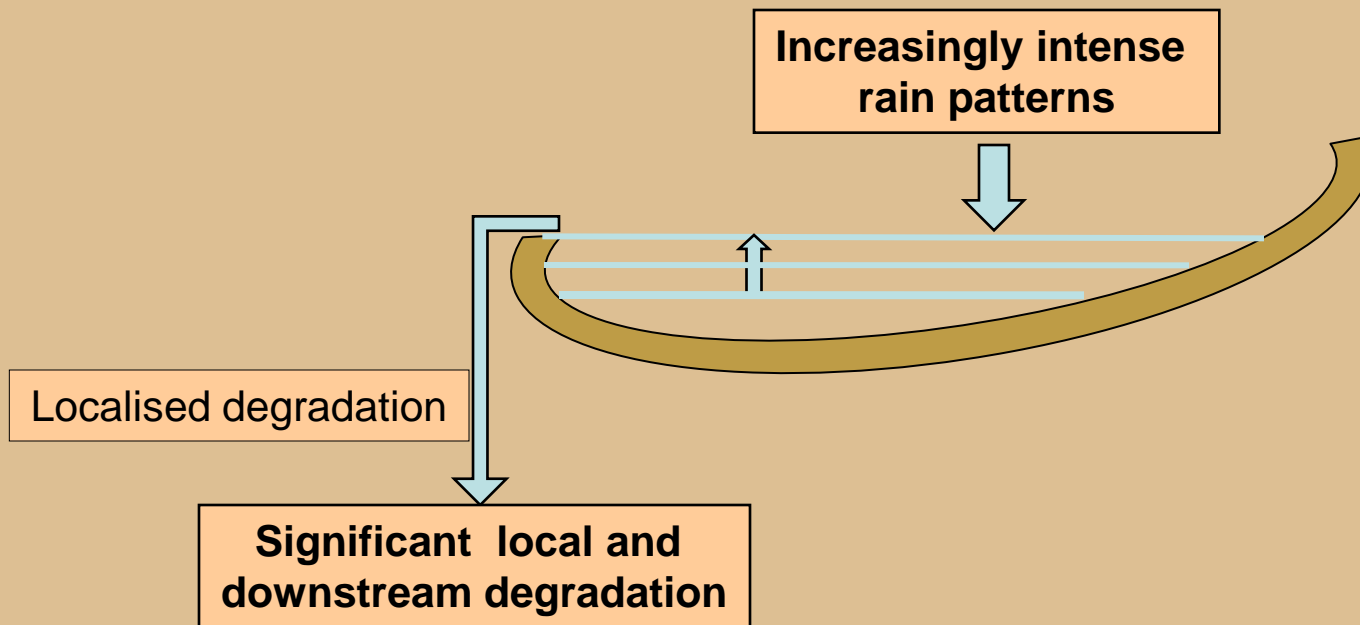
*'with native vegetation catchment was in water balance'*

# View the Wheatbelt as a bathtub today



***'loss of native vegetation put catchment out of water balance'***

***‘Soon the bath tub will be so full it will be nigh impossible to empty’***

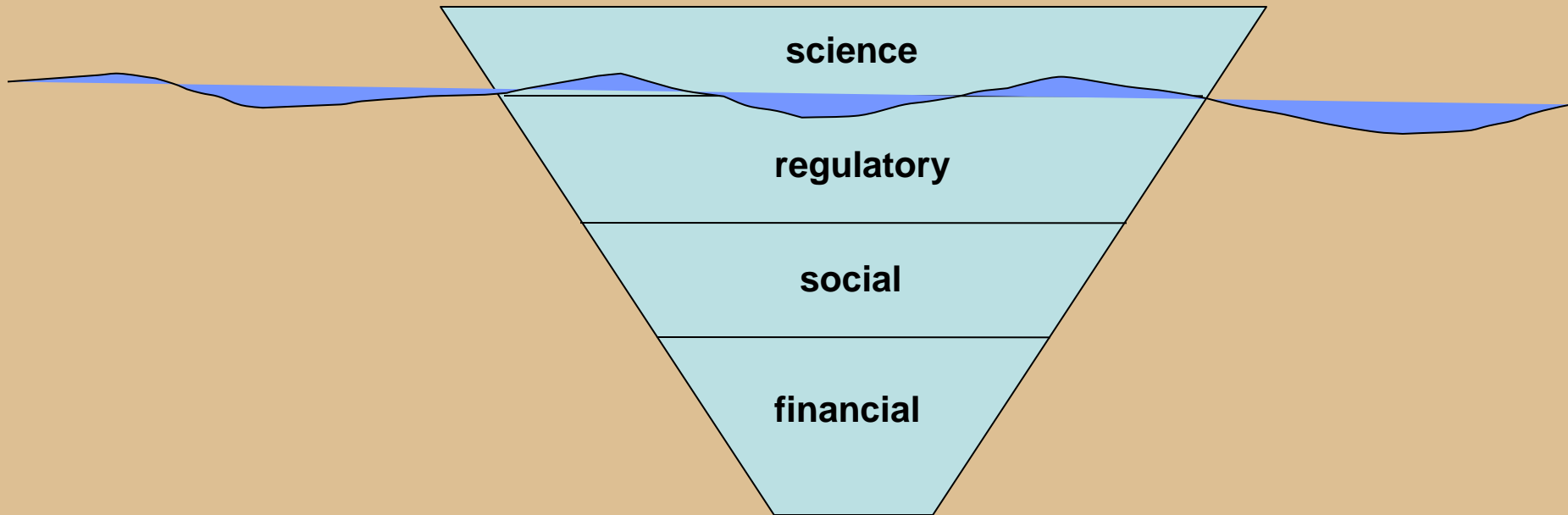


**Up to 20% of 18 million hectares severely degraded or under threat  
Significant maintenance pressure on rural infrastructure  
Long term direct impact on all major river systems**

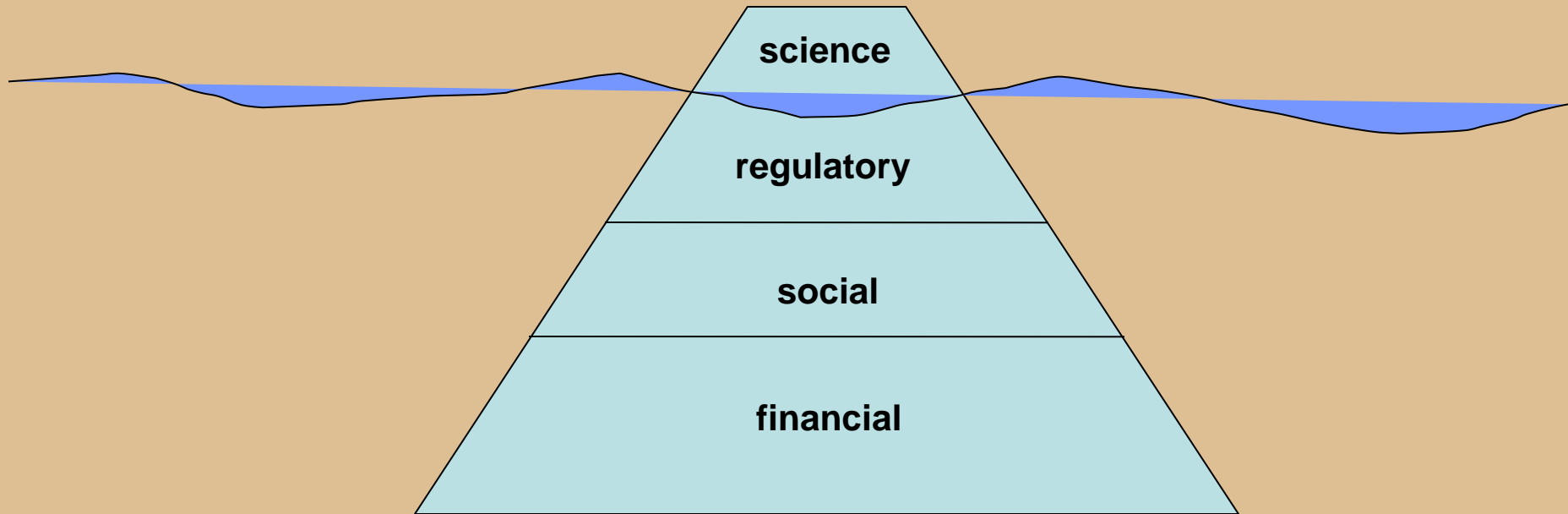
# Historical Context

1895	Clearing commenced
1935	Increasing salinity scientifically linked to clearing
1950	First (of six) Government Salinity Reviews (Last in 2005)
1960's	Compound fertilisers accelerate light land clearing
70's on	Primary Industry funding → agricultural focus
80's on	Primary Industry funding → ecological sustainability
90's on	Commonwealth Environment → biodiversity
	» NRM programs vegetation based and community driven
	» State political reticence
	» Farmers react with significant deep drain works
2000's	SAP 2000 program for Recovery, Containment and Adaptation <i>Language of Prevention not included</i>
Now	CfoC creates prescribed responses not landscape needs

# Government Preoccupation

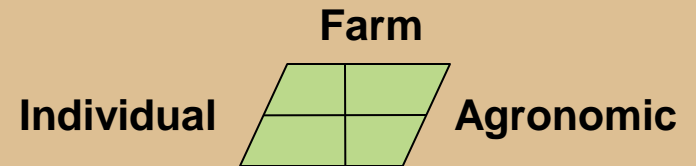


# Community Preoccupation



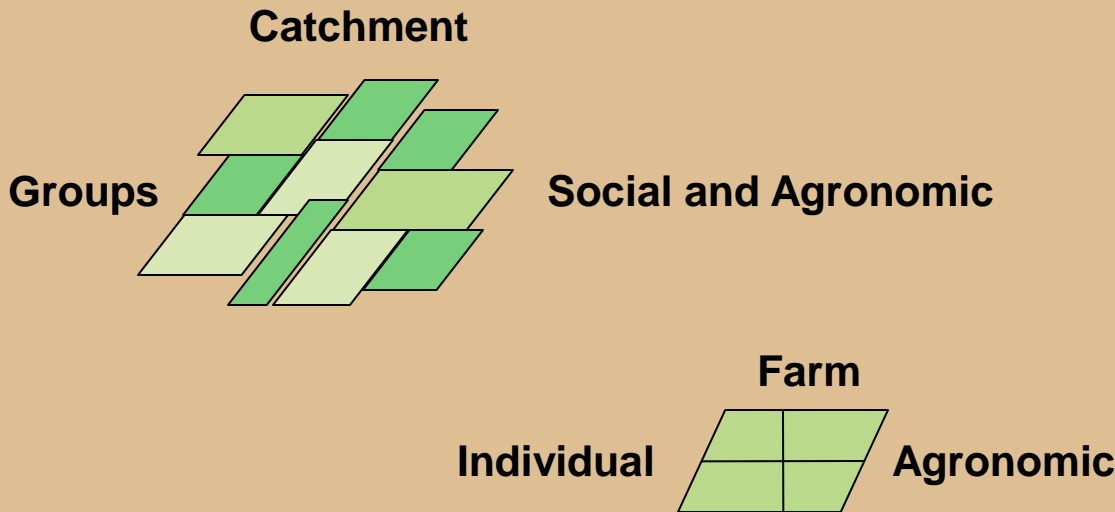
*'the iceberg effect'*

# Clash of Drivers

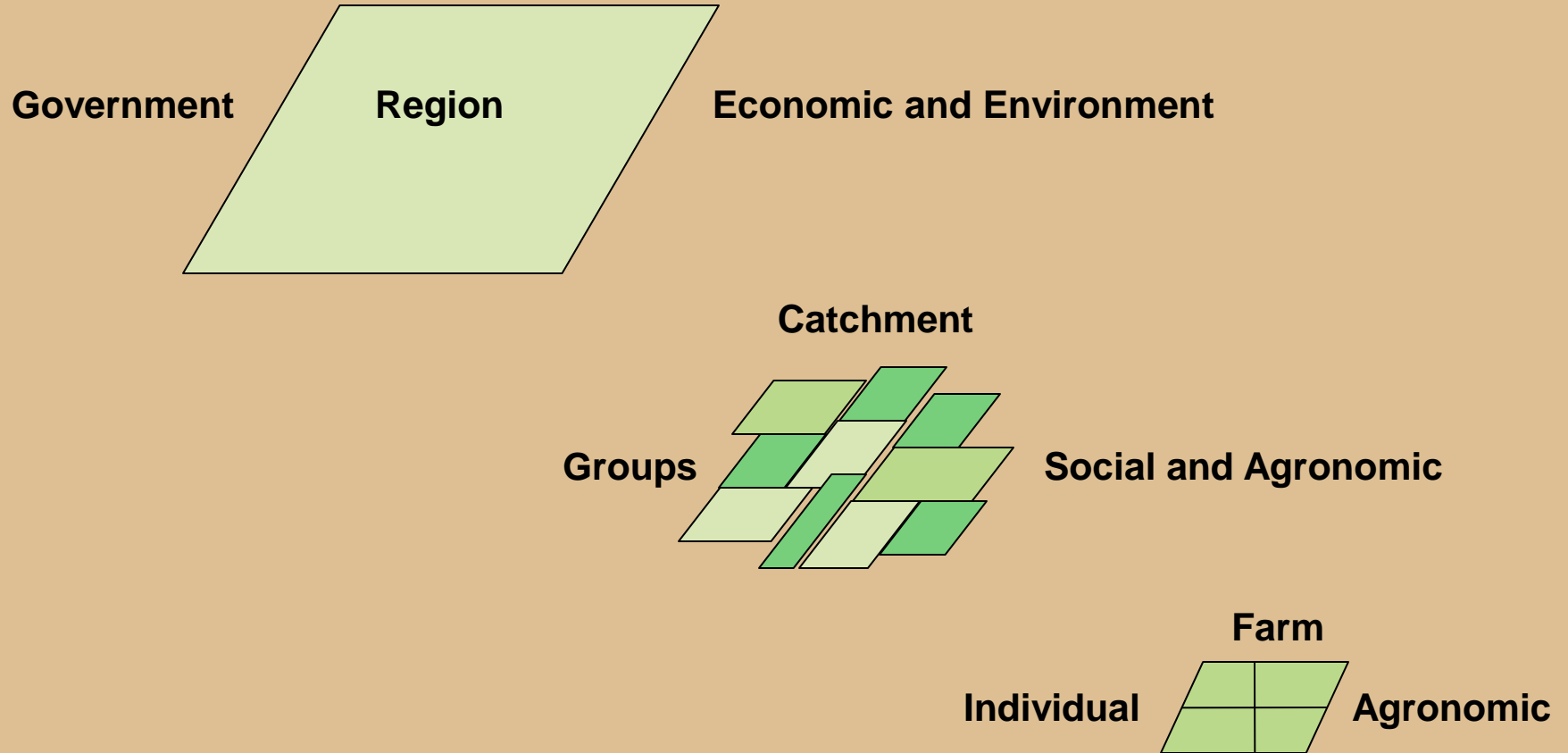




# Clash of Drivers



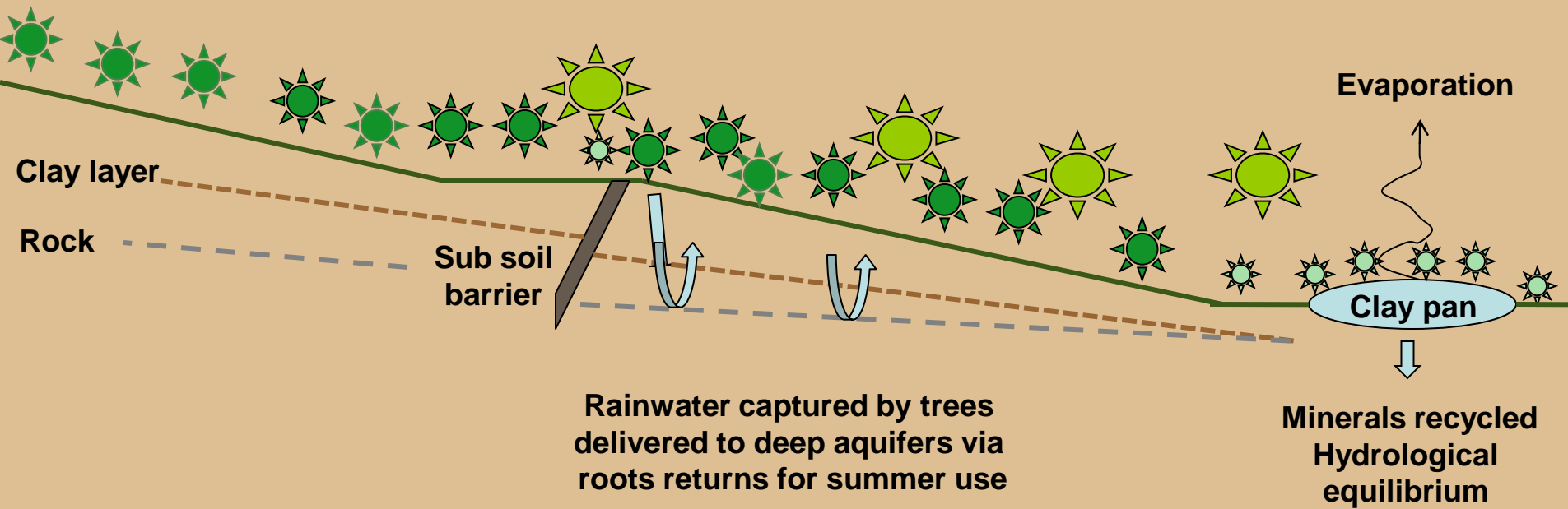
# Clash of Drivers



# 'Resulting Confused Messages'

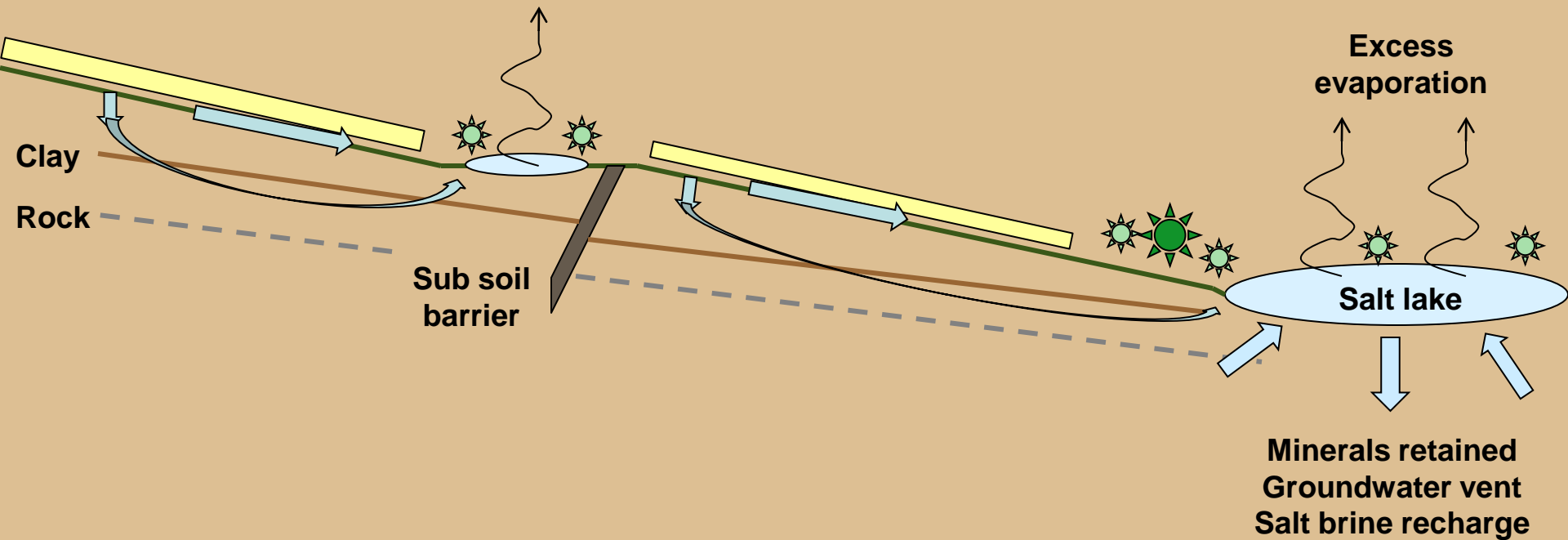
- Trees versus Drains
- Saltbush or 'just let it go'
- Surface water banks or vegetation
- Precision farming or banks
- Government focus
  - Crops and farming practices - Agriculture
  - Hydrology and groundwater - Water
  - Biodiversity retention - Environment
  - Continuous reviews and plans
  - Limited *on ground* action
- Community disagreement

# Landscape prior to clearing



*'Native vegetation retains moisture, encourages flora reducing recharge'*

# Landscape post clearing

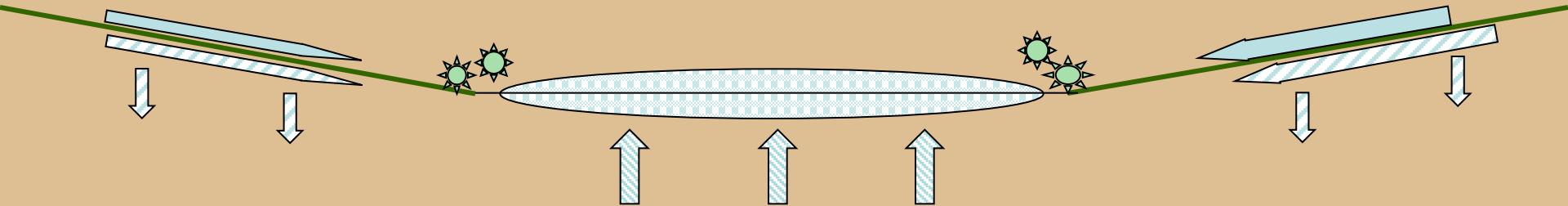


*'Clearing land increases surface water runoff and groundwater recharge'*

# Design Opportunities and Challenges

## Design Challenges:

- Excess surface water run off
- High volume 'sheet' flood flows
- High soil temperatures
- Deteriorating soil health
- Groundwater saline and acidic
- Deteriorating remnant vegetation

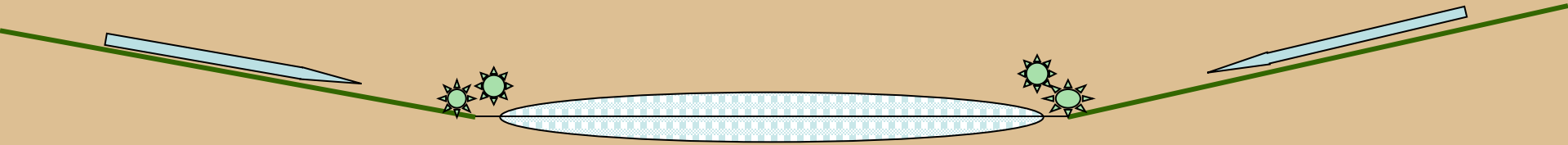


## Design Opportunities:

- High evaporation rate
- Episodic low velocity flood flows
- Sand aquifers can become fresh
- Unlimited ground water
- Initial drain surge then settles
- Improved farm practices

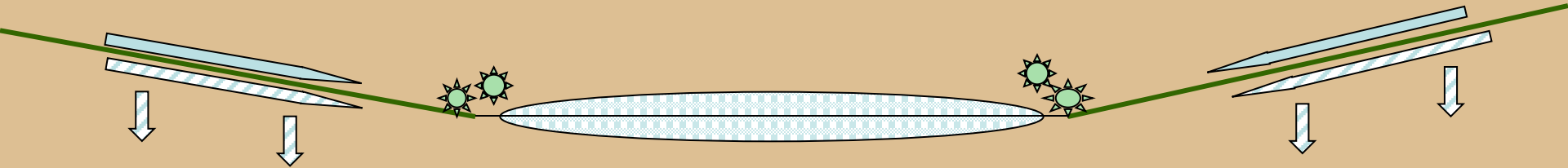
# Issues to be Addressed

*Excess surface water runoff*



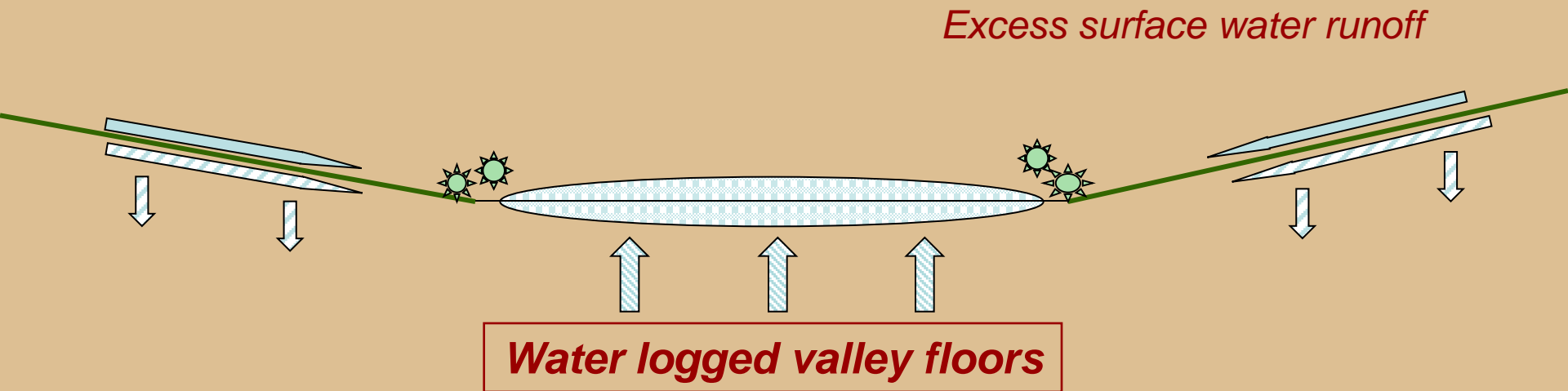
# Issues to be Addressed

*Excess surface water runoff*



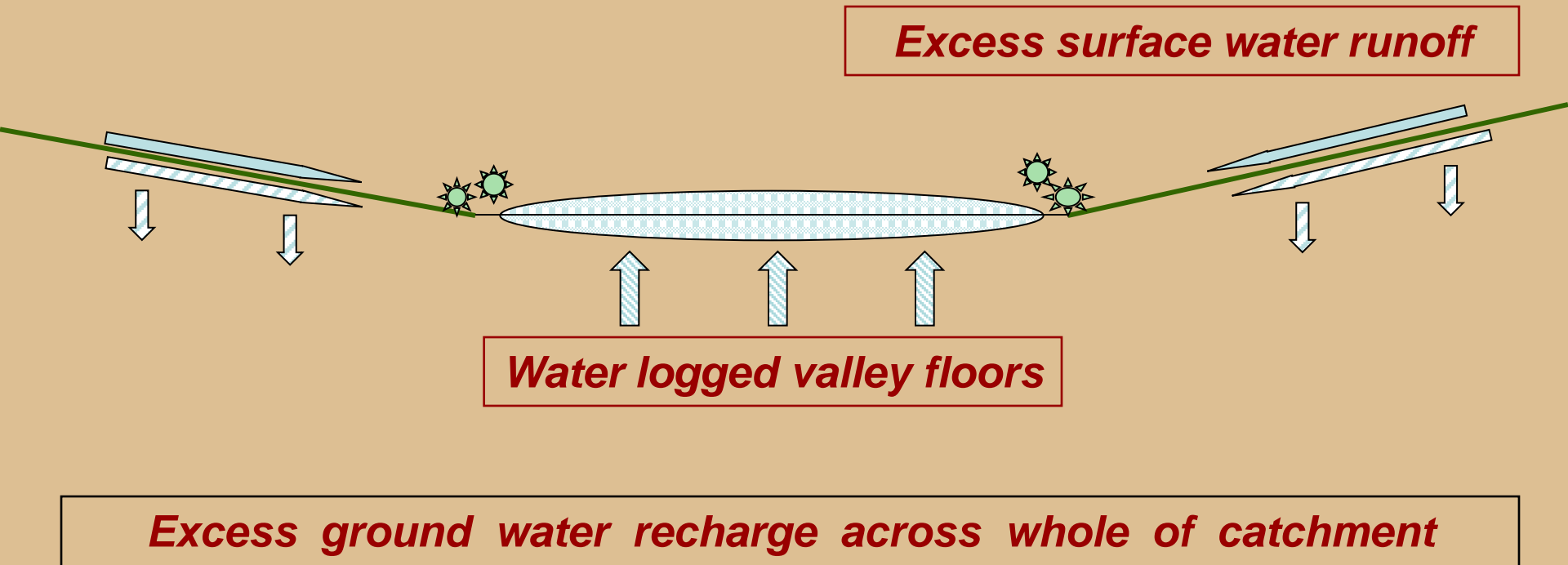
*Excess ground water recharge across whole of catchment*

# Issues to be Addressed



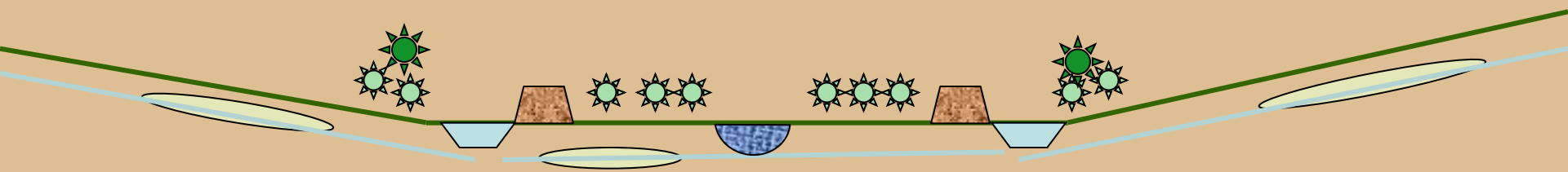
*Excess ground water recharge across whole of catchment*

# Summary of Issues to be Addressed



# Reducing Water Logged Valley Floors

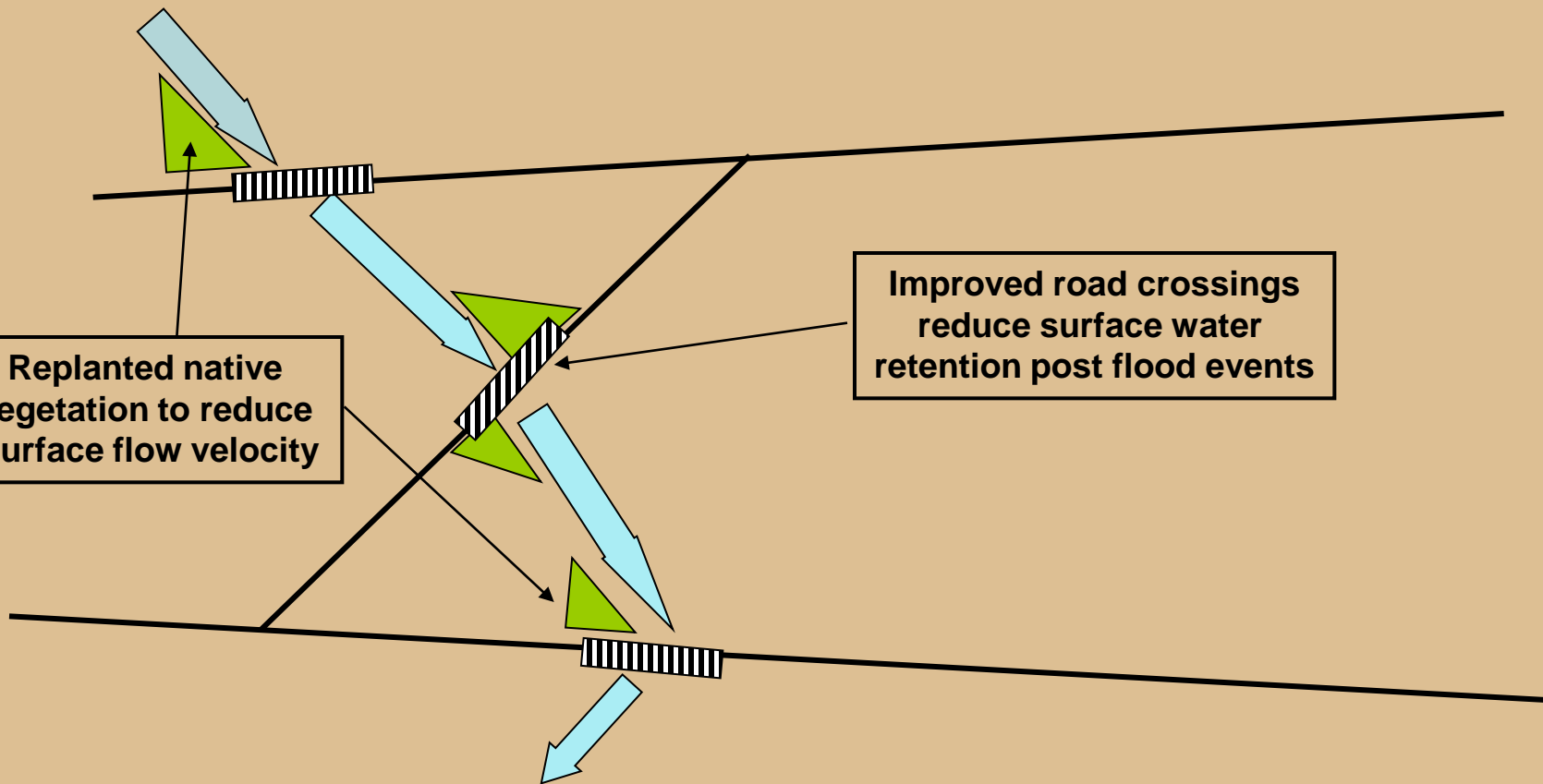
*'Use guide banks along creek line to guide excess flood water from lowlands'*



*'Utilise saltbush and other  
vegetation to retard flood flow and  
remove 'ponded' fresh water'*

# Reducing Water Logged Valley Floors:

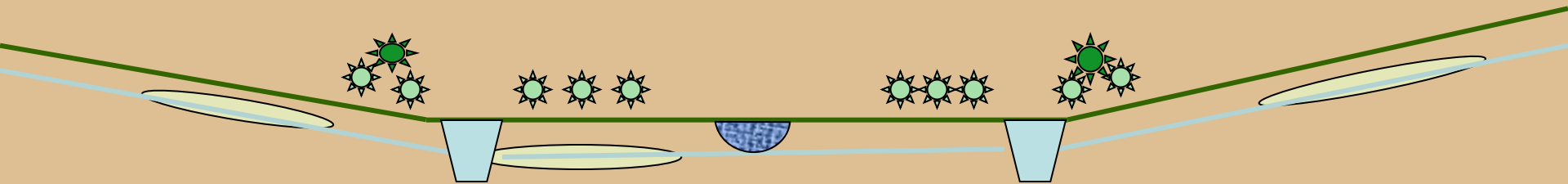
*Reduce long term 'ponding' at Nokanning*



*'reducing the environmental impact of road infrastructure'*

# Reducing Water Logged Valley Floors

*'Selectively deep drain to local playas to naturally evaporate excess groundwater'*



## Deep drain design considerations;

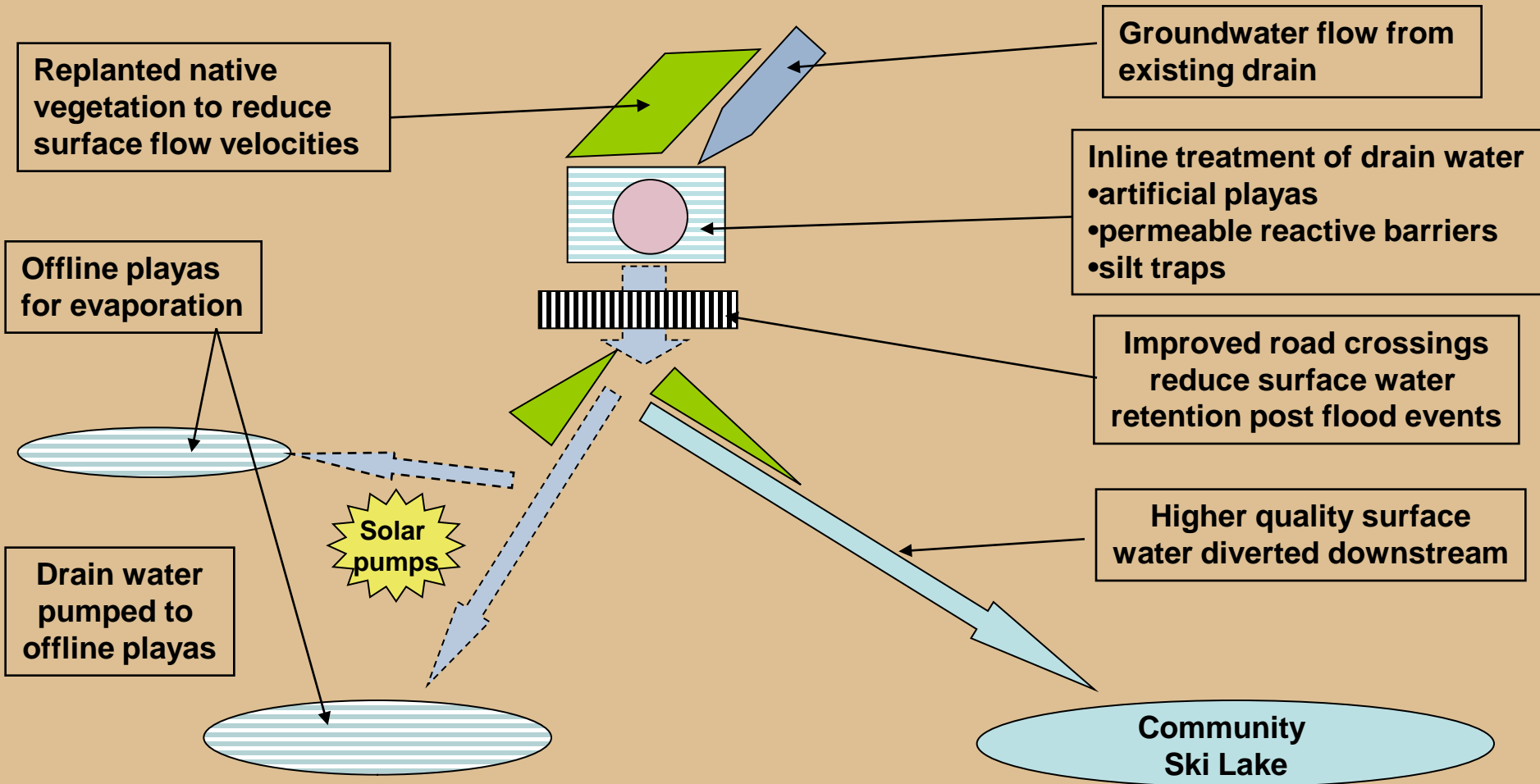
- position drain at 'break of slope' and banded
- nominally two metres deep
- initially groundwater surges then stabilises
- avoid 'harvesting unlimited ground water'
- treat groundwater as highly saline and acidic
- utilise inline filters to increase pH (if reqd.)
- harness local playas for evaporation of discharge
- separate surface water from ground water

## Impact of deep drains is to;

- lower water table in immediate vicinity
- freshen 'perched' water tables  
*creates illusion drains are flowing 'fresh'*
- act as conduit for flood events

# Reduce Water Logged Valley Floors:

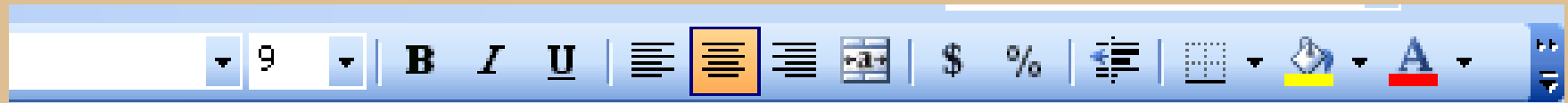
*Mimic local environment: Trayning*



*'engineering concepts to minimise the environment impact of ground water'*

# Reduce Water Logged Valley Floors:

*Harness high evaporation rates*



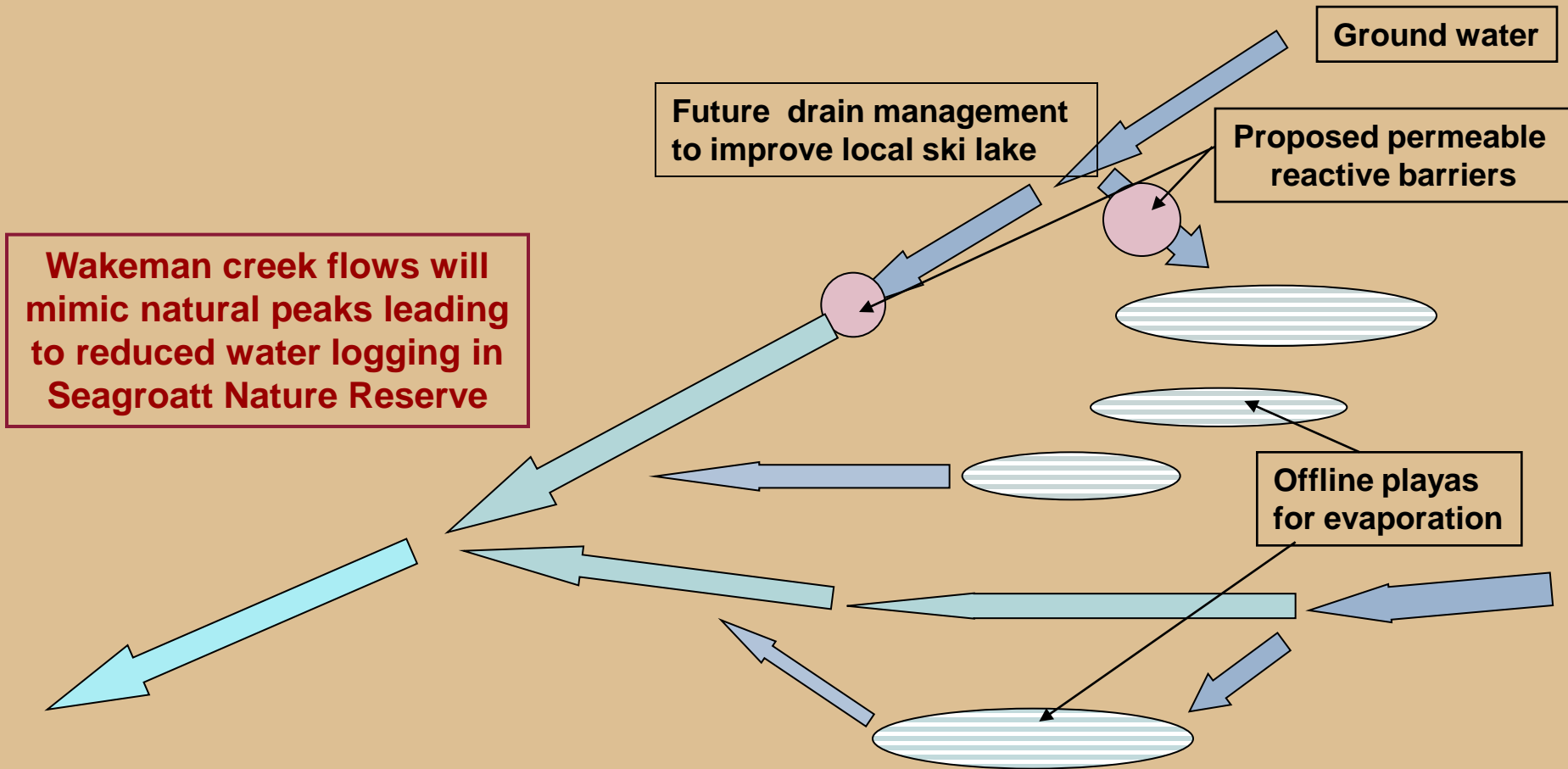
Predicted drain flow per day

P	Q	R	S	T	W
Surface Area (sq.m)	Flow (L/km/s)	Flow Vol (L/day)	Evap Vol (L/day)	Balance (L/day)	Cost (Total)
82918.59	0.275	354506.00	567936.00	-213429.00	\$ 263,243.
40.00	0.507	175.19	273.97		
40.00	0.507	175.19	273.97	-98.79	\$ 332.
1506.00	0.328	28412.79	10315.07		
1506.00	0.328	28412.79	10315.07	18097.72	\$ 20,080.
4355.00	0.00				
4355.00	0.00			-29828.77	\$ 5,226.
15024.50	0.33				
2170.50	0.328	40949.51	14866.44	26083.07	\$ 28,940.
300.00	0.349	904.14	2054.79	-1150.66	\$ 2,750.
4294.50	0.328	81021.73	29414.38	51607.34	\$ 57,260.
300.00	0.349	904.14	2054.79	-1150.66	\$ 2,750.
4833.00	0.328	91181.28	33102.74	58078.54	\$ 64,440.

Predicted flow per day after evaporation.

# Reduce Water logging in Valley Floor

*Mimic local environment : Narambeen*



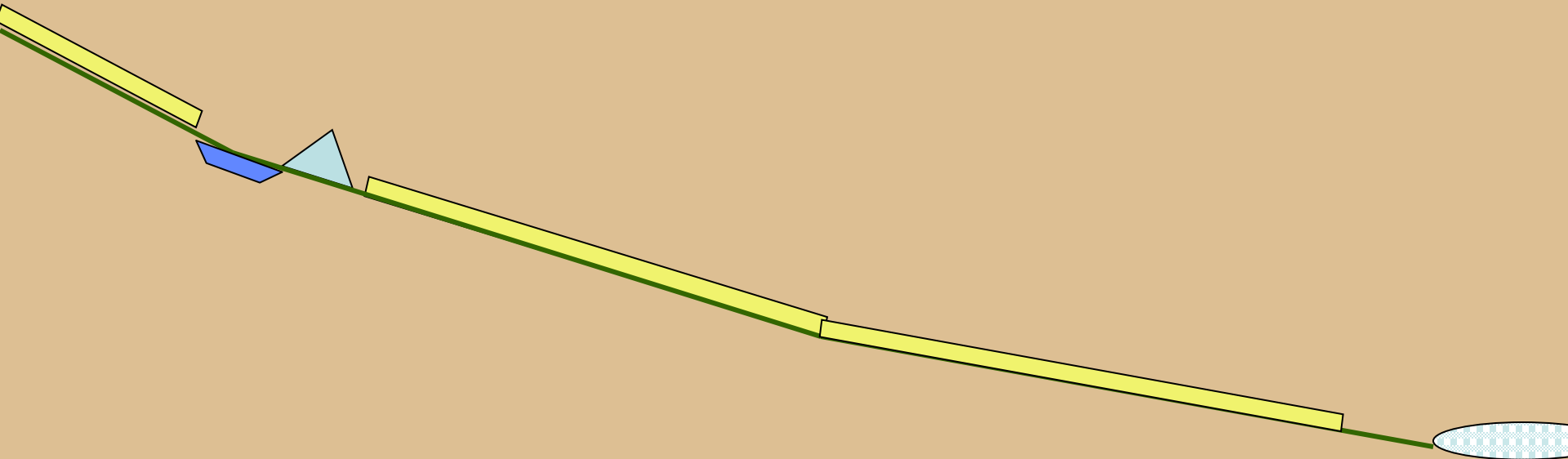
*'Utilisation of playas on large scale to return creek to original behaviour'*

# Excess Surface Water Runoff

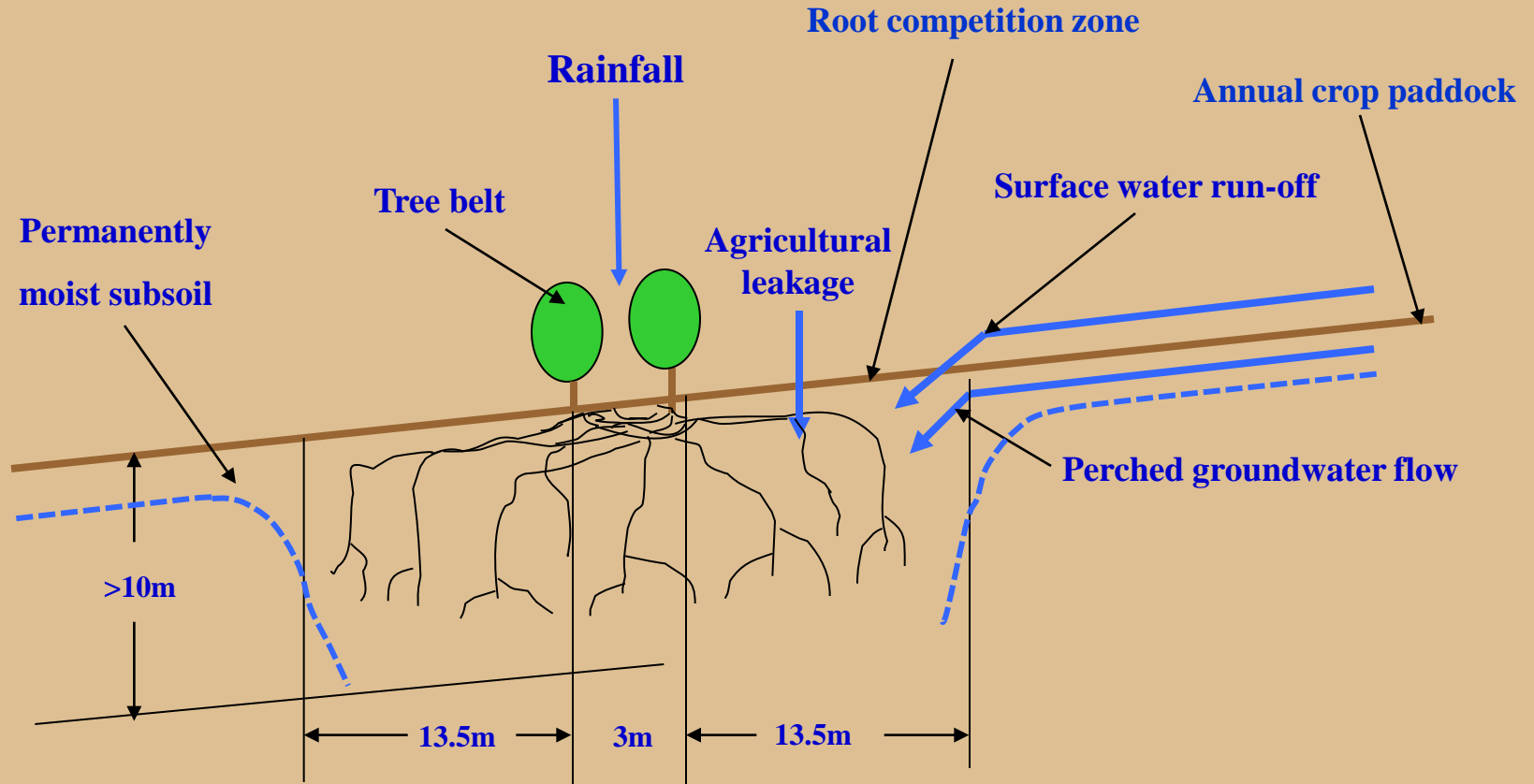
*'Retain fresh surface water in landscape to reduce groundwater recharge'*

Grade banks  
linked to dams

Water for stock, fish farming, algae etc

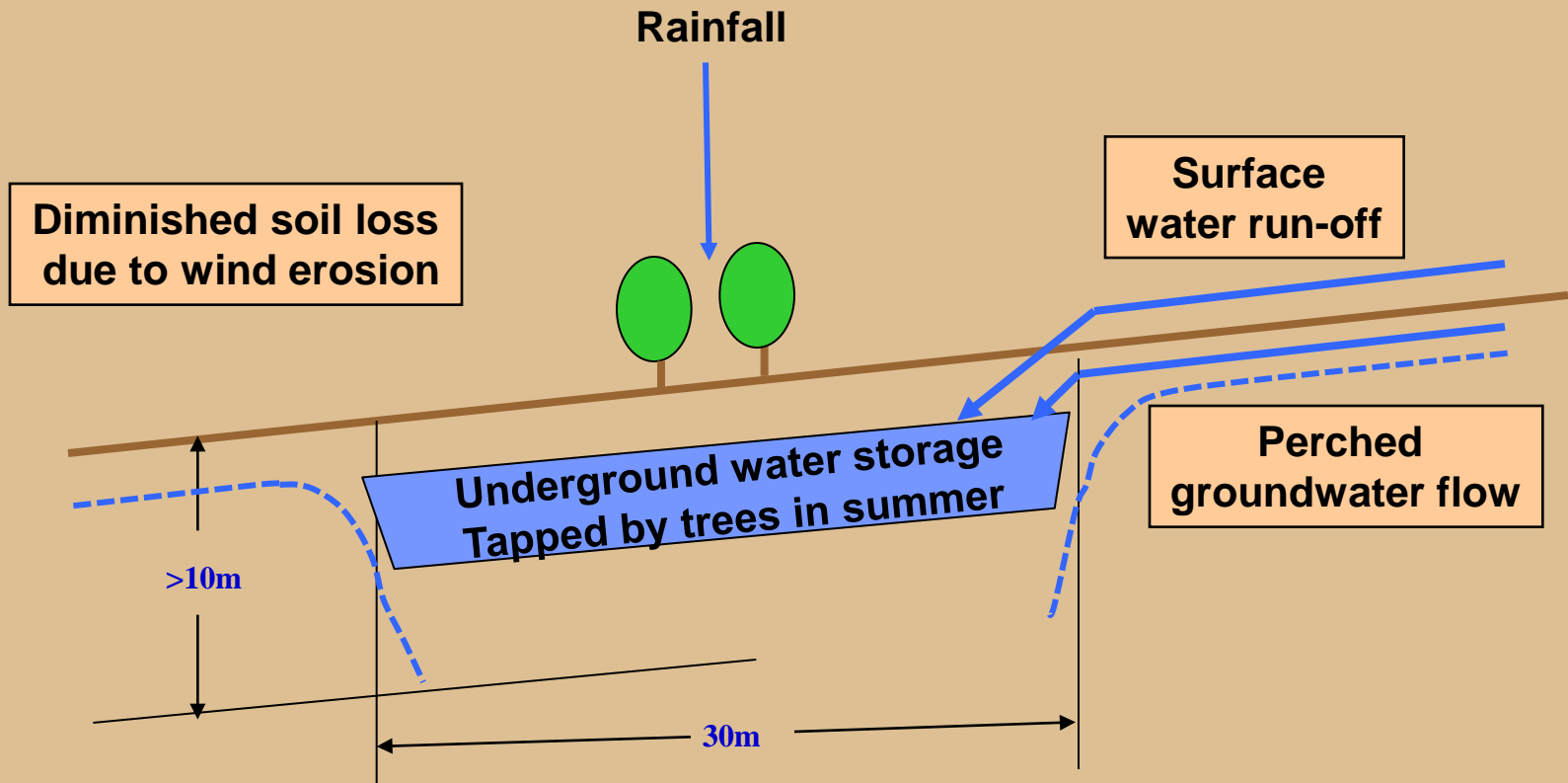


# 'Harvest Water with Tree Belts'



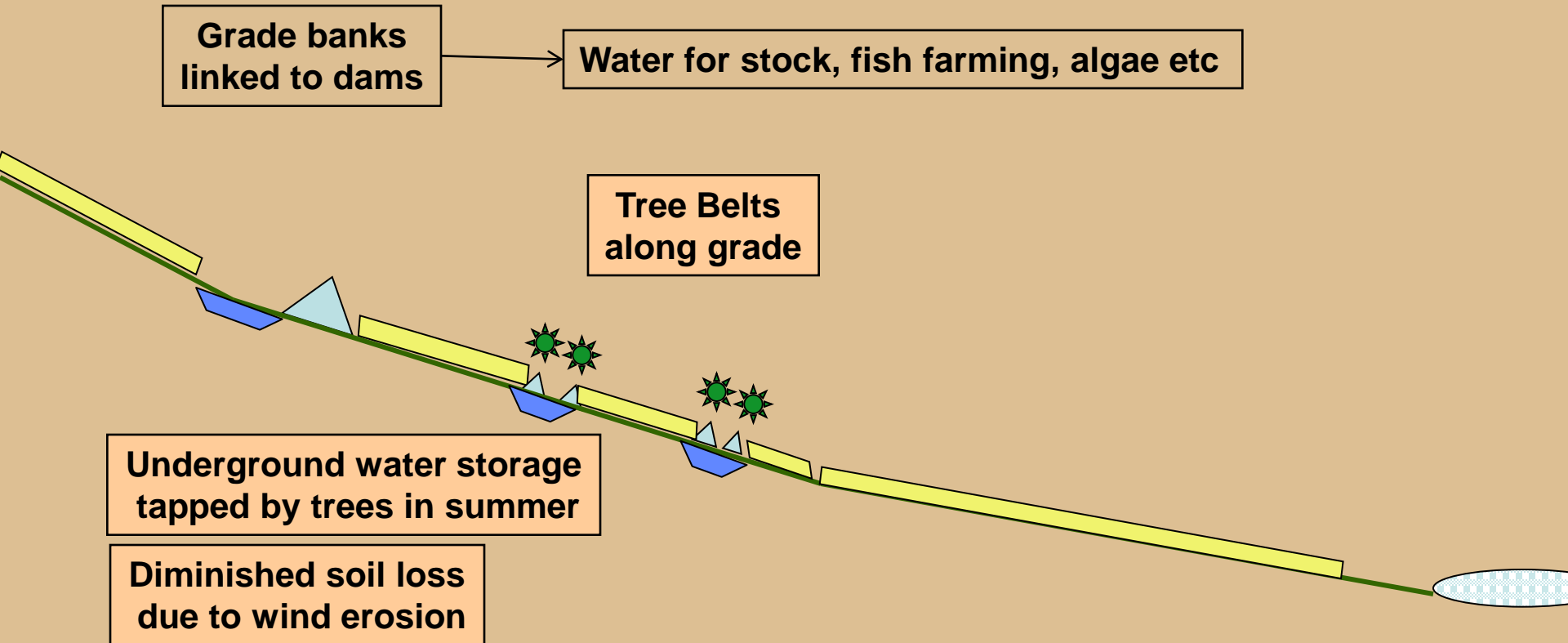
*With thanks to John Bartle*

# 'Harvest Water with Tree Belts'



# Excess Surface Water Runoff

*'Retain fresh surface water in landscape to reduce groundwater recharge'*

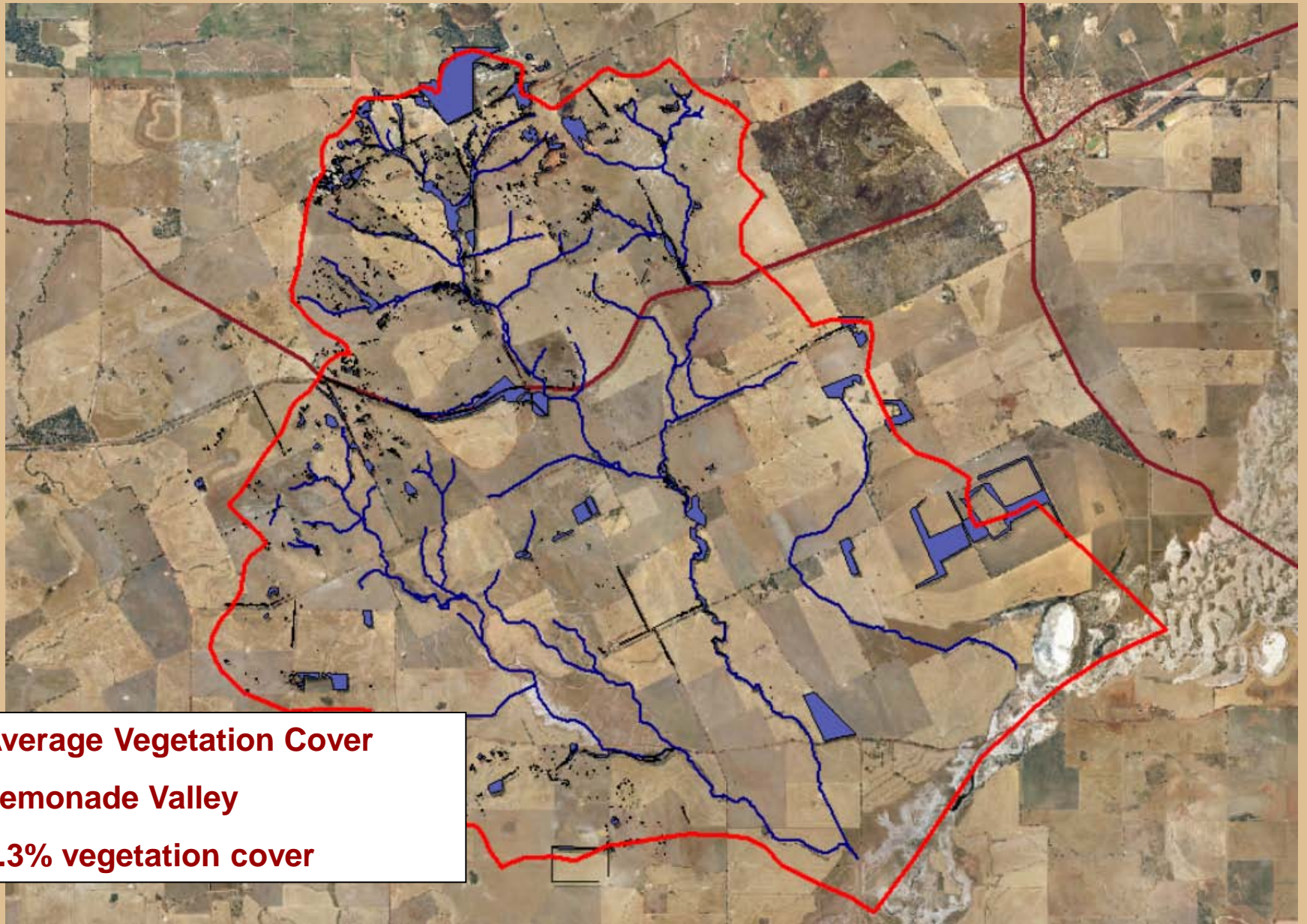


# Reducing Groundwater Recharge:

## *Catchment Vegetation Cover*

- **Target Catchment vegetation cover of min. 15%**
- **Utilise Native Vegetation Belts suitable for harvesting**
- **Require commercial drivers to enhance investment;**
  - **Renewable power generation**
  - **Transport biofuel**
  - **Sequester carbon**
  - **Land conservation tax refunds**
  - **Wildflowers, honey and native medicine**
  - **Tourism and employment**
- **Role of Government vital in facilitating new industries**

# Average Catchment Vegetation Cover



**Average Vegetation Cover**  
**Lemonade Valley**  
**4.3% vegetation cover**

# Reducing Groundwater Recharge:

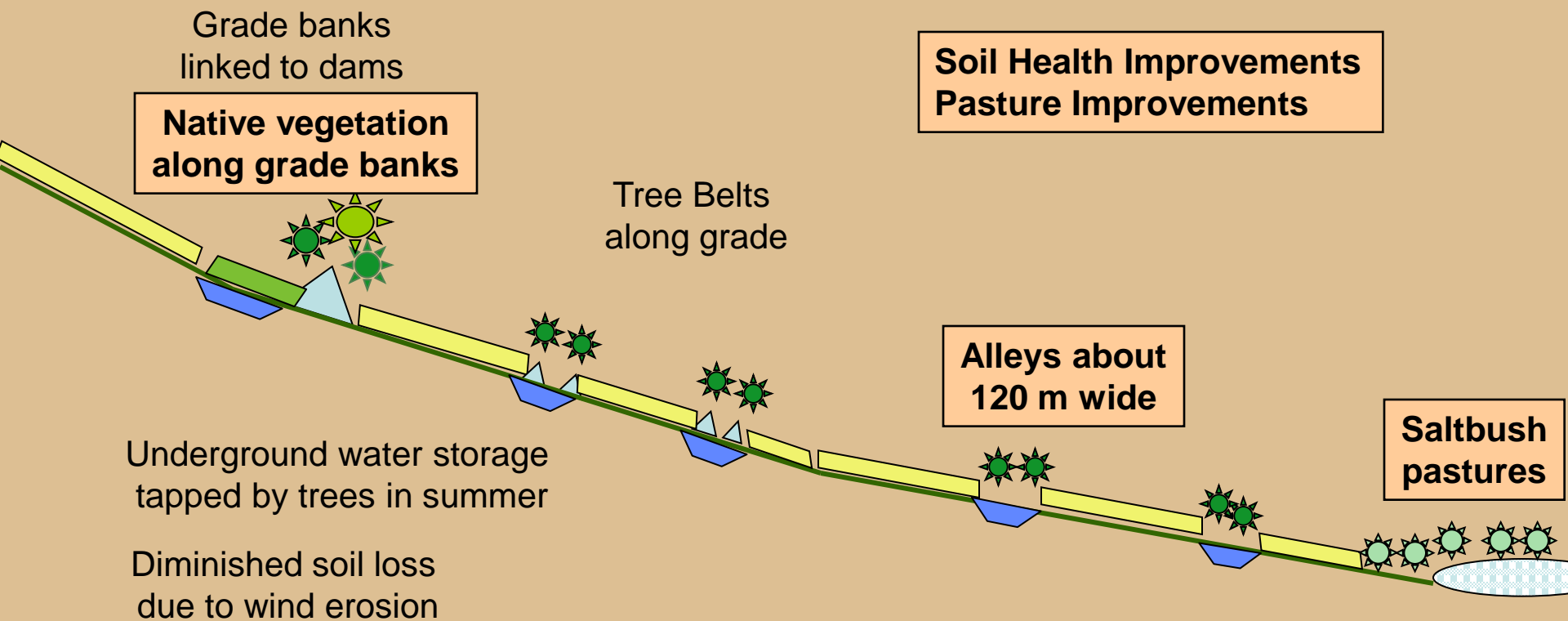
## *Pasture and Soil Improvements*

- **Research pasture alternatives (winter and spring)**
  - Salt tolerant wheat and barley
  - Hemp, Soya bean or alternatives
- **Enhance soil health**
  - Natural farming sequences
  - No till
  - Stubble retention

*‘Enhancing the use of fresh water by the pasture can only be beneficial’*

# Reducing Groundwater Recharge

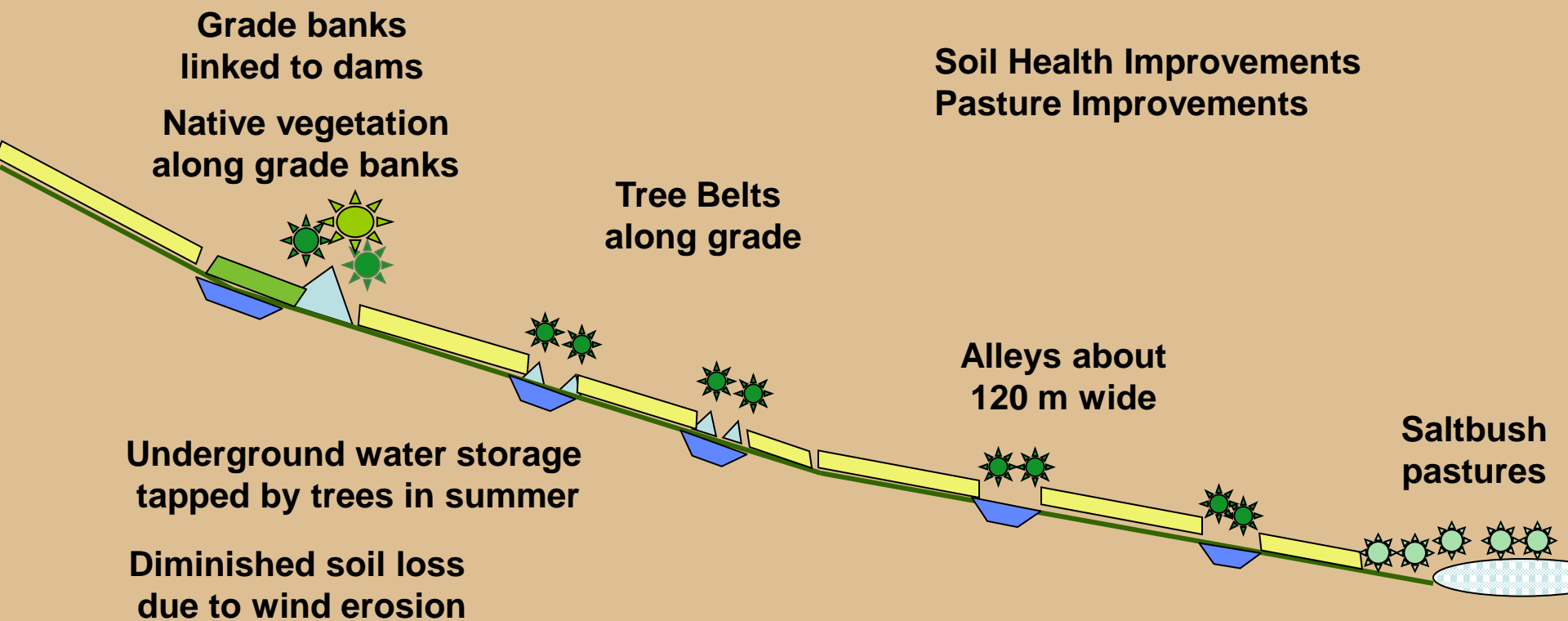
*'Retain fresh surface water in landscape to reduce groundwater recharge'*



*Effective surface water management through the catchment plus vegetation cover of 15% will likely optimise farmer commercial returns*

# Reducing Groundwater Recharge

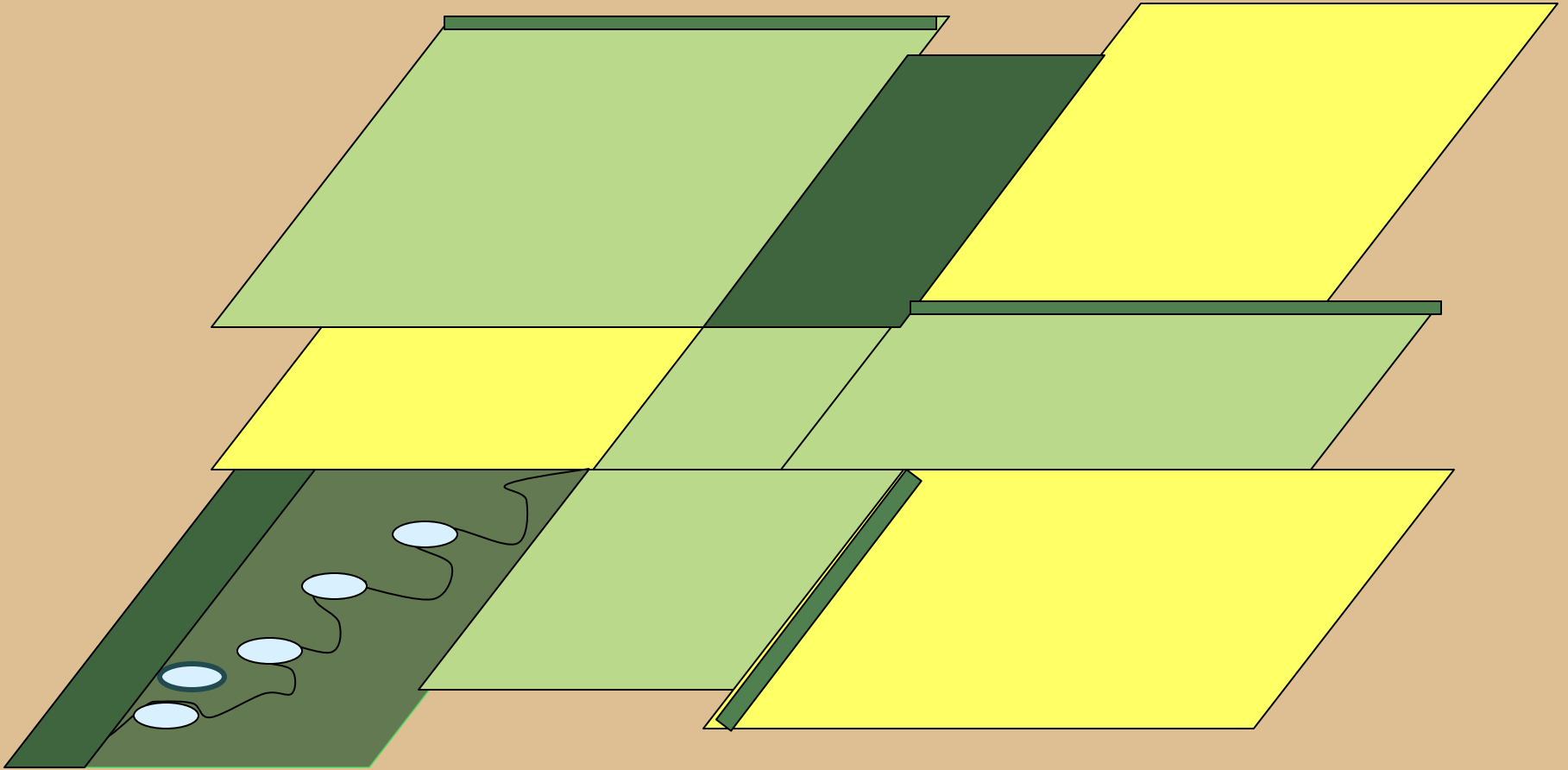
*'Retain fresh surface water in landscape to reduce groundwater recharge'*



*Effective surface water management through the catchment plus vegetation cover of 15% will likely optimise farmer commercial returns*

# Creating a Resilient Catchment

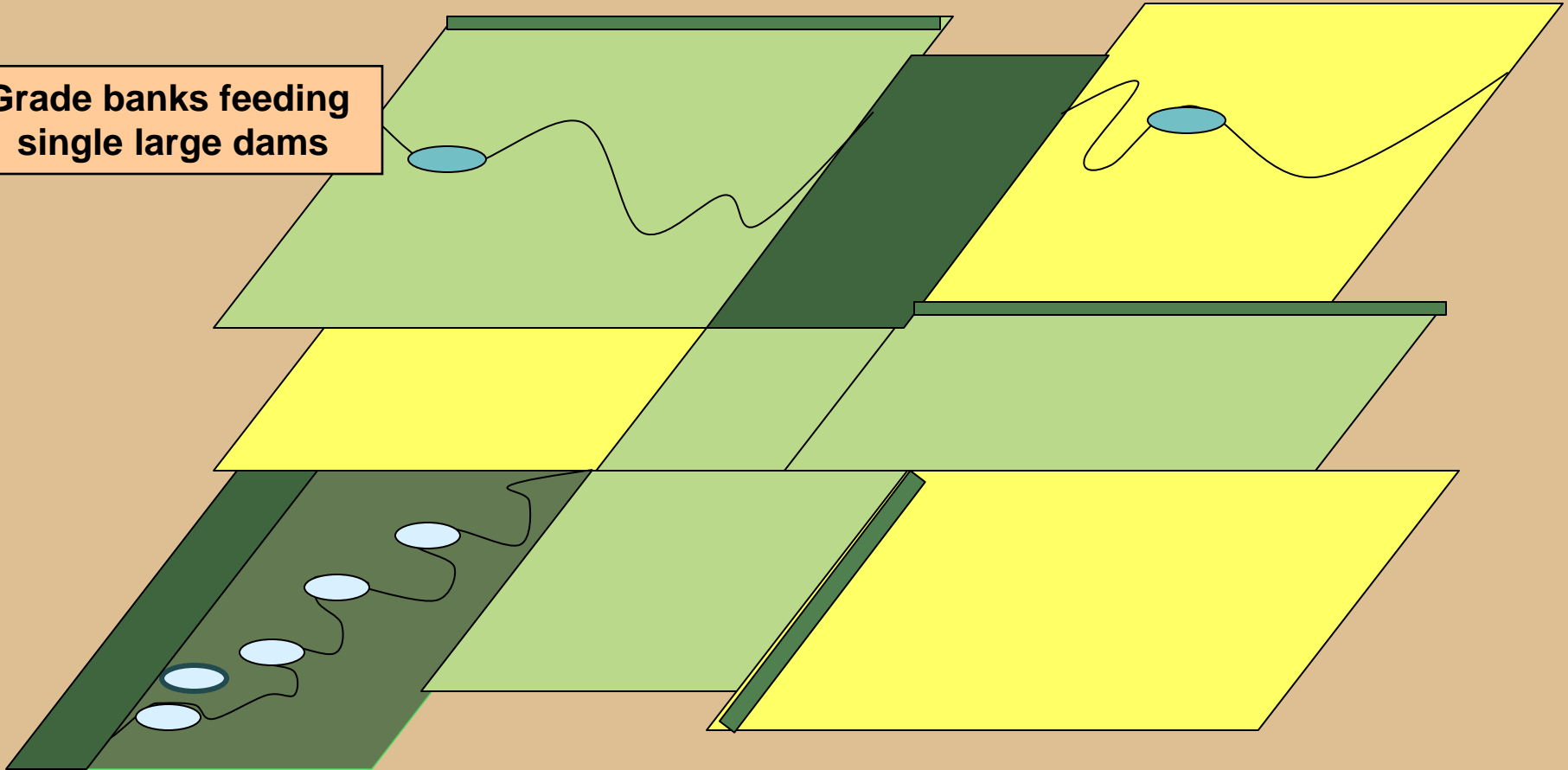
*'Mimic the landscape to reduce runoff, improve soil retention and crop productivity'*



# Creating a Resilient Catchment

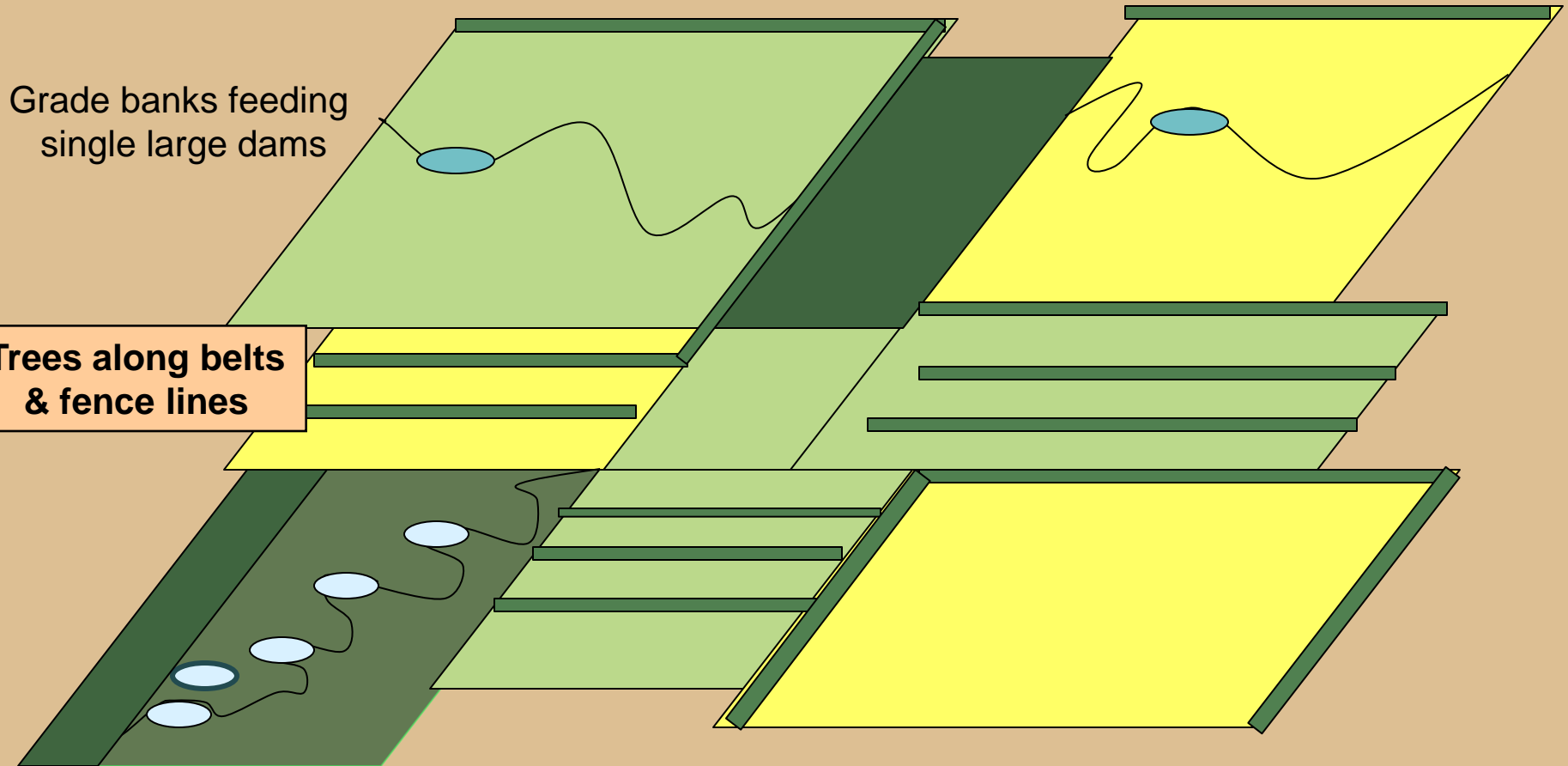
*'Mimic the landscape to reduce runoff, improve soil retention and crop productivity'*

Grade banks feeding  
single large dams



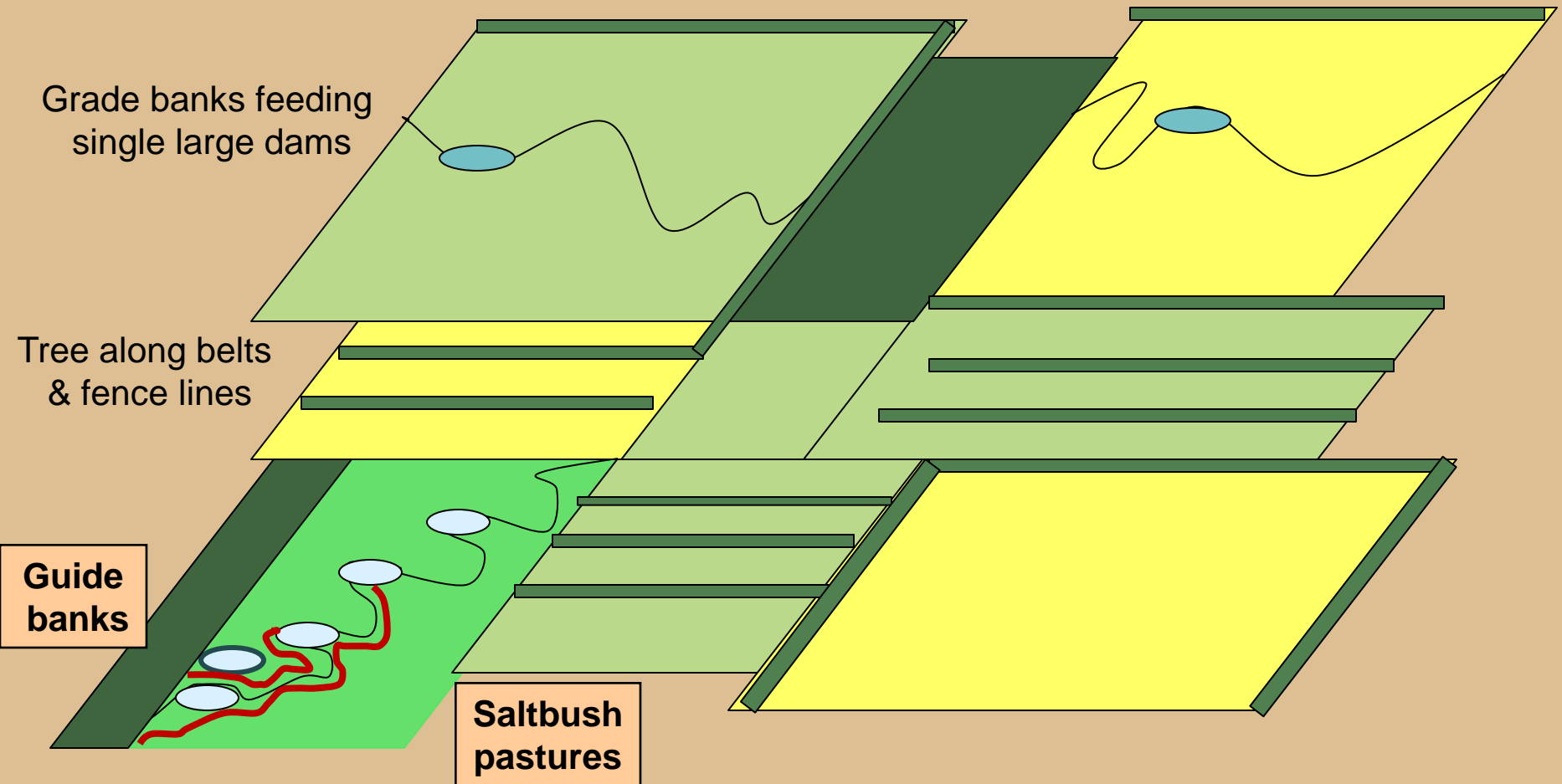
# Creating a Resilient Catchment

*'Mimic the landscape to reduce runoff, improve soil retention and crop productivity'*



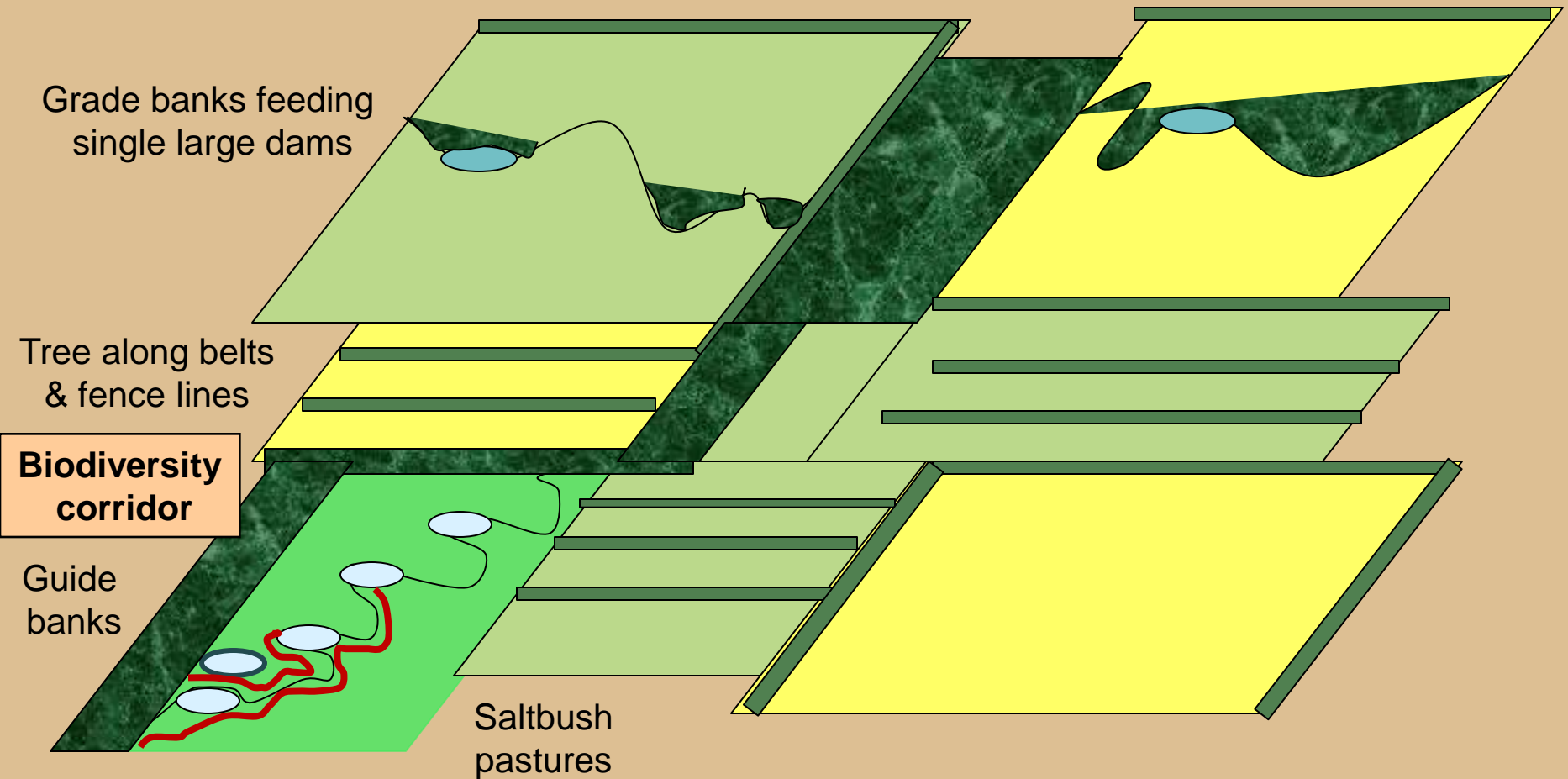
# Creating a Resilient Catchment

*'Mimic the landscape to reduce runoff, improve soil retention and crop productivity'*



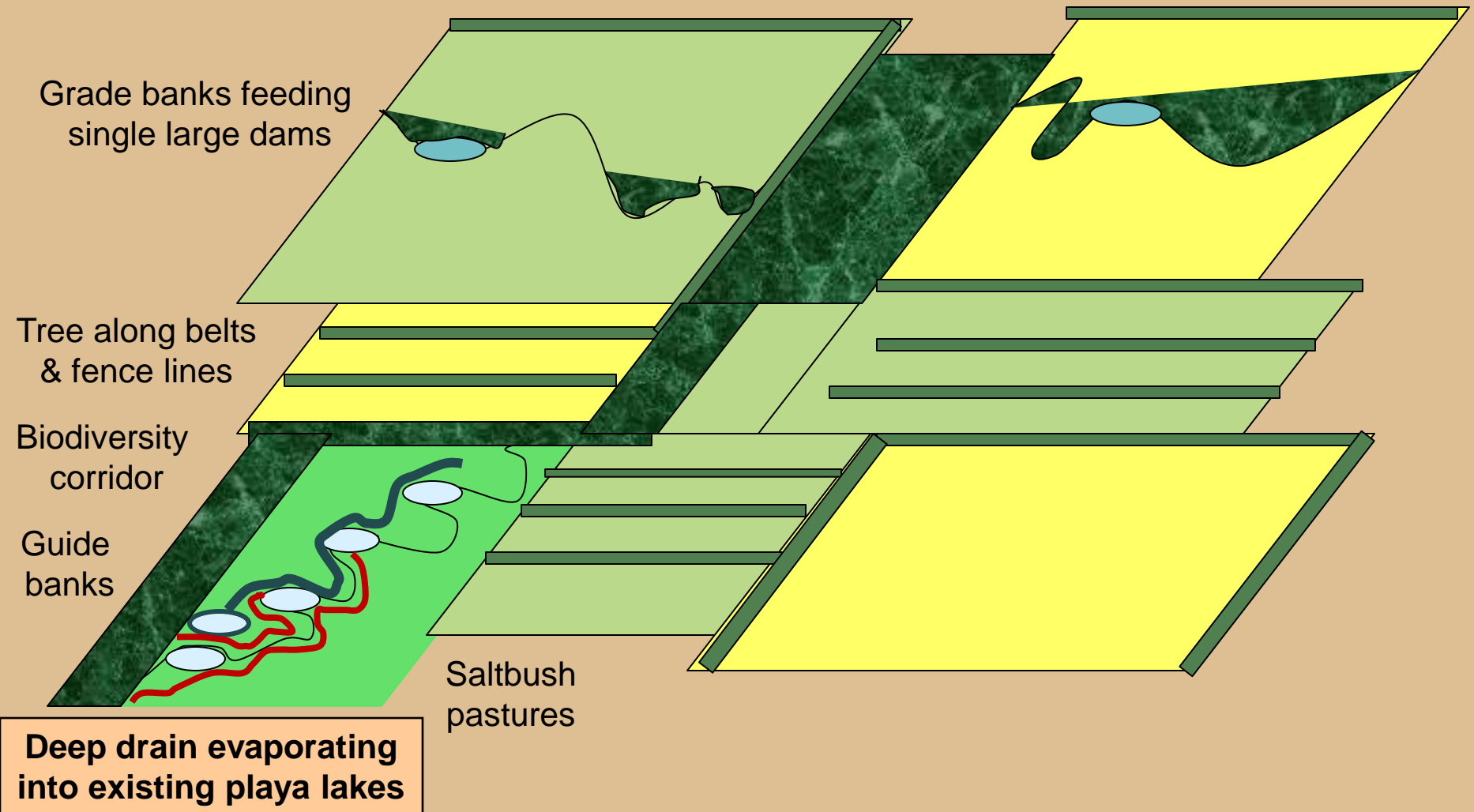
# Creating a Resilient Catchment

*'Mimic the landscape to reduce runoff, improve soil retention and crop productivity'*



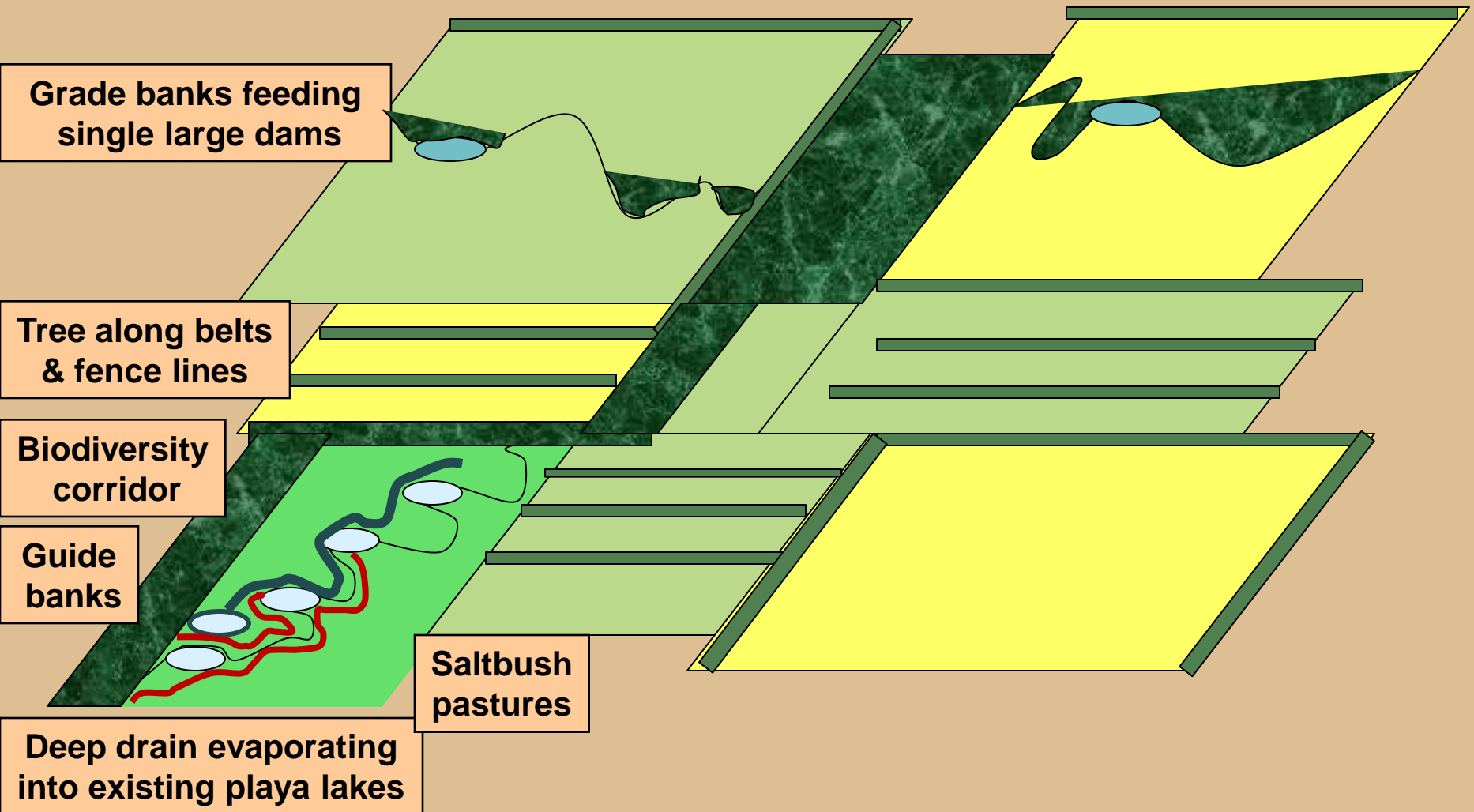
# Creating a Resilient Catchment

*'Mimic the landscape to reduce runoff, improve soil retention and crop productivity'*



# Creating a Resilient Catchment

*'Mimic the landscape to reduce runoff, improve soil retention and crop productivity'*





# Precautionary Principle

EPA Position Statement No 7. Principles of Environmental Protection , 2004

*The precautionary principle states that where there are **threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.** In the application of the precautionary principle, decisions should be guided by –*

- (a) **careful evaluation to avoid serious or irreversible damage** to the environment where possible; and*
- (b) an **assessment of the risk-weighted consequences** of various Options.*

**Have we as a community applied the Precautionary Principle correctly?**

# Questions for Consideration

- **Choices we can make;**
  - **When will it be bad enough to need real action?**
  - **Do we keep finding new land or face up to this issue?**
  - **Is it best to continue to adapt our practices?**
  - **OR do we enrol in catchment wide prevention?**
  
- **Collective commitment to addressing the problem;**
  - **Can we live with the proposed approach?**
  - **What education is needed?**
  - **What financial incentives are required?**
  - **What regulatory support is needed?**
  - **How will it be lead and by whom?**
  - **When do we need to act?**

*What will be our collective legacy?*

# Recommendations for Consideration

*‘develop common understanding to deliver shared outcomes’*

- **Education**
  - Establish discussion forums with key influencers Q3/4 09
  - Collate outcomes from previous investment programs Q3/4 09
  - Conference on “Creating Resilient Landscapes” Q1 2010
  - Farmer & Catchment, School & Community, Government and officers
- **Financial incentives**
  - Industry support
  - Tax offsets
  - Government resources
- **Regulatory facilitation**
  - Environmental
  - Local Government
  - Commonwealth
- **Delivery**
  - Program management by private sector to coordinate public sector
  - Implement four catchment scale management trials commencing Q3 2010

**Acknowledgements:**

Ian Campbell, Don Woodcock, John Hall, John McKay, Max Hudson, Peter Hudson, John Ruprecht, Tim Sparks, Ken McIntosh, Jason Lette, Nick Cox, Dave Rowlands, Dan Ferguson, Lance Mudgeway, John Bartle, Bob Nulsen, Richard Hobbs, Andrew Watson, Buddy Wheaton, James Coventry, Scott Mitchell, Steve Thomas, Richard George, Mick Caughey, Greg Giles, Murray Giles, Rosemary Smith, Kieran Hardy, Ron White, Jim Chown, Wilson Tuckey, Paul Davies, Ann Connelly, Owen Gent, Bart Hull, Garry English, Malcolm Turnbull, Hendy Cowan, Bruce Male, Neil Henning.

Thank you