

Confronting Climate Change: *Vetiver System Applications*

The Fifth International Conference on Vetiver (ICV-5)

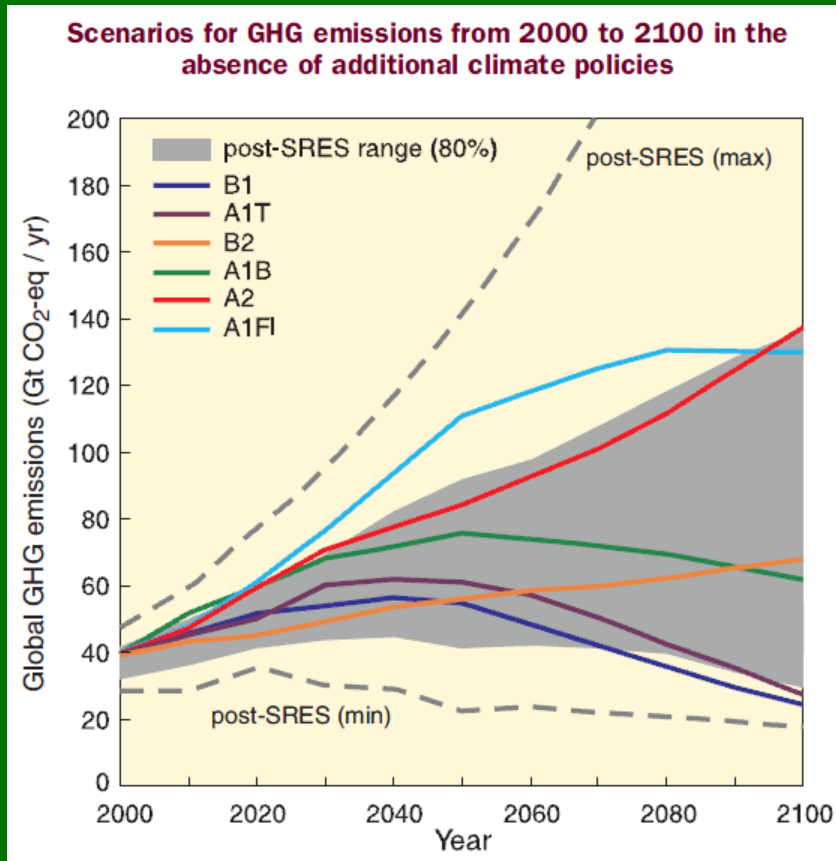
Vetiver and Climate Change

Lucknow, India, October 28-30, 2011



The Vetiver Network International
Proven & green environmental solutions

Climate Change Effects: 2100



Change seems certain;
most scenarios negative,
some worse than others.

Temperature?: 1.1 – 6.4°C
(locally highly variable)

Sea Level Rise?: 0.18 – 0.59m
(locally highly variable)

Precipitation?: increase >20%
(high latitudes) – decrease
>20% (subtropical)



Climate Change Effects

Fresh water: Generally, dry drier & wet wetter | Aridity expands | Extreme events increase, greater rainfall variability | Intense flood risk increase | Surface supplies, esp. glaciers & snow, reduced

Ecosystems: Resilience of many exceeded this century

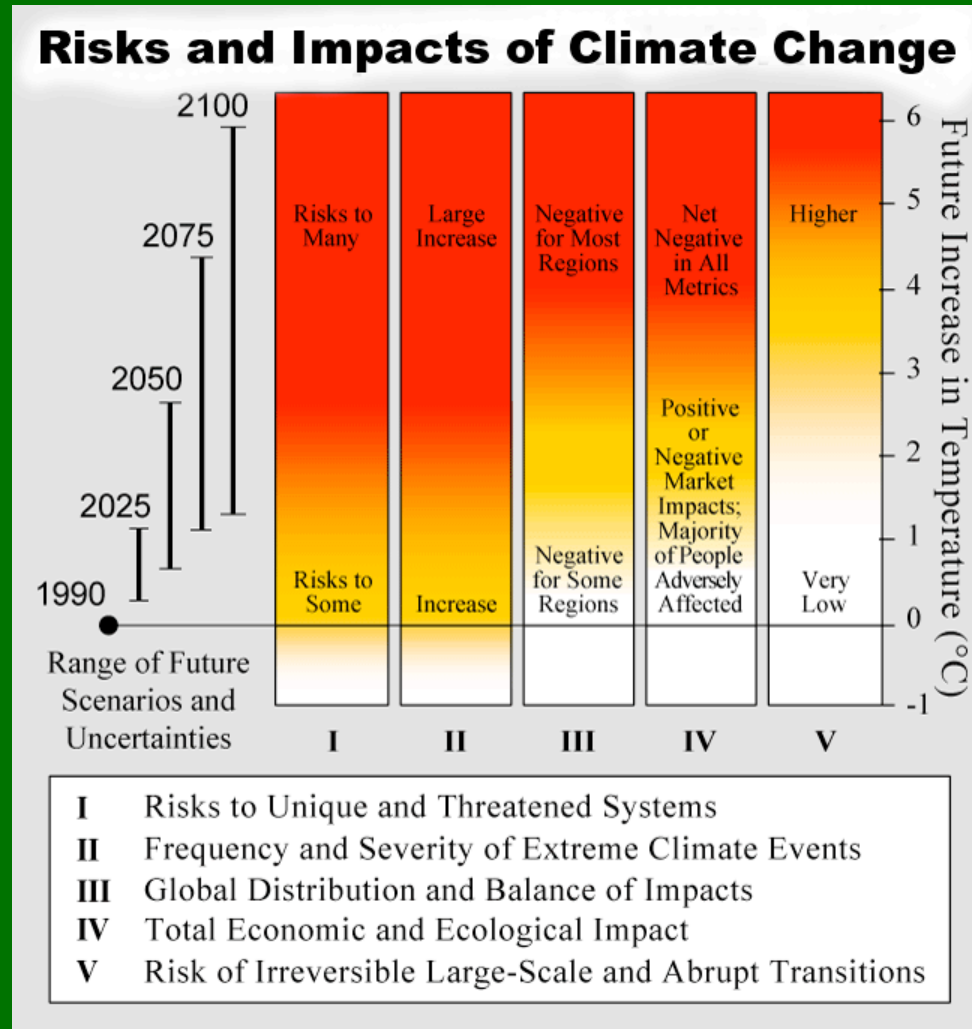
Food: → If temperature rise ≤ 3 °C, potential production may increase w/ CO₂ fertilization, but decrease if temperatures higher (surge followed by collapse)

Coastal areas: Sea level rise | Salinization of fresh water (rivers, estuaries, groundwater) | Increased coastal erosion (tropical storms, mangrove and coral reef loss | Flooding (storm surge, inundation)

Temperatures: Extremes of heat & cold more frequent



Why Be Concerned?



Who Are The Most Vulnerable?



Source: Maplecroft, 2011



Climate Change: India

Indian Network for Climate Change Assessment (INCCA), 2010

- Objective: ascertain CC impacts in 2030s.
- Four major regions: Himalayan, North Eastern, Western Ghats, & Coastal Region



Impacts by 2030

Temperature: + 1.7°C to 2.0°C w/ greater seasonal variability

Extreme temperatures: daily maximum & minimum intensify

Precipitation: small increase in annual; fewer rainy days

Extreme Precipitation: increased frequency

Cyclones: fewer, more intense

Storm surge (coastal): 5% to 20% increase

Sea-level Rise: on average, slight increase (50 – 80mm)



Impacts by 2030

Water availability: variable, generally wetter = increase & drier = decrease

Sediment yields: up to 25% increase, most areas

Floods: 10% to 30%, compared to 1970s, most regions

Drought: earlier onset, moderate – extreme in southern portion NE; West Coast; most severe in Himalayas

Crop Water Demand: increases 5% - 20% in Himalayas & NE; variable Coastal Zone; decrease nominal to 5% other areas



Impact Pathways

- Reduced dry season flows & droughts
- Higher peak flows & flash flooding
- Increased landsliding
- Salinization coastal areas
- Urban water supply & drainage
- Infrastructure stability (dams, bridges, roads, etc.)

Source: INCCA, 2010



Impact Pathways

- Land degradation & loss: erosion/flood/sediment
- Agriculture: overall declines in total yield for all regions & most crops (rice, sorghum, maize, mustard, wheat, apple)
- Increased temperature/humidity stress on livestock
- Food security (high risk) *source: Maplecroft, 2010*

Source: INCCA, 2010

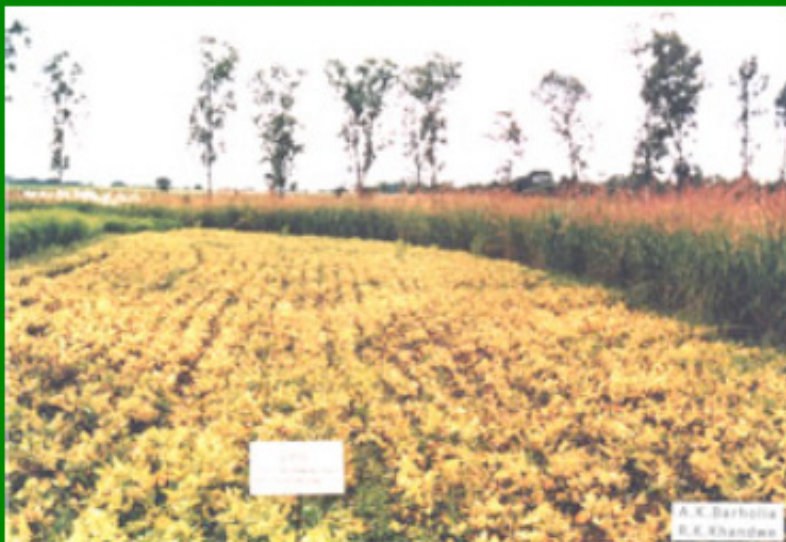


VS Applications: Climate Change Adaptation & Enhancing Resilience

Impact Pathways	Soil & Moisture Cons.	↓ Runoff Velocity & Trap Sediment	Divert Flows	Enhance Infiltration	Infra. Protection & Stabilization	Slope & River Bank Stabilization	Others (Fodder/ Thatching/ Mulch)
↓ Dry season flows & droughts	X			X			X
↑ Peak flows & flash flooding	X	X	X	X	X	X	X
↑ Landsliding		X	X			X	
↑ Salinization					X		
Urban water supply/drainage				X		X	
Infrastructure stability (dams, bridges, roads)		X	X		X	X	
Land loss & degradation	X	X	X	X	X	X	
Ag: ↓ total yield	X	X		X			X
↑ Temp/humidity & stress livestock	X			X			X
↓ Food security	X	X	X	X			



SOIL AND WATER CONSERVATION



Sehore - Madhya Pradesh, India
1% slope - black cotton soil

North-west Ethiopia - 1,500 asl
20% slope - volcanic soil

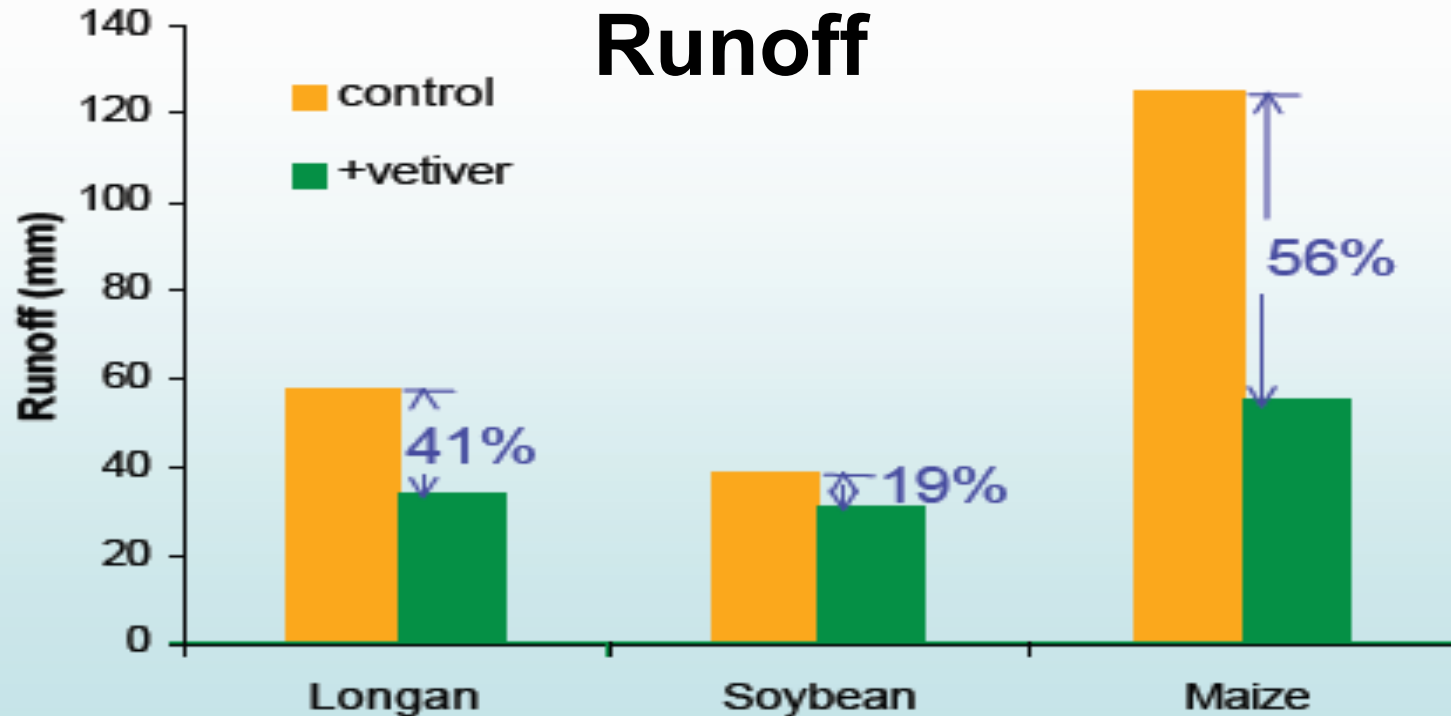
Reduce Runoff Velocity & Trap Sediment



Gully stabilization in the Congo (DRC)



Enhance Infiltration



Source: B. Deesaeng, J. Pheunda, C. Onarsa and A. Boonsaner. 2006.
Vetiver potential for increasing groundwater recharge. Watershed
Research Division, Wildlife and Plant Conservation Department.
Bangkok, Thailand



The Vetiver Network International
Proven & green environmental solutions

Divert Flows



Vetiver protecting a spillway



Infrastructure Protection



Brazil – Residential Slope Stabilization



Infrastructure Stabilization



Malaysia – Highway Stabilization



The Vetiver Network International
Proven & green environmental solutions

Sea Dike Protection



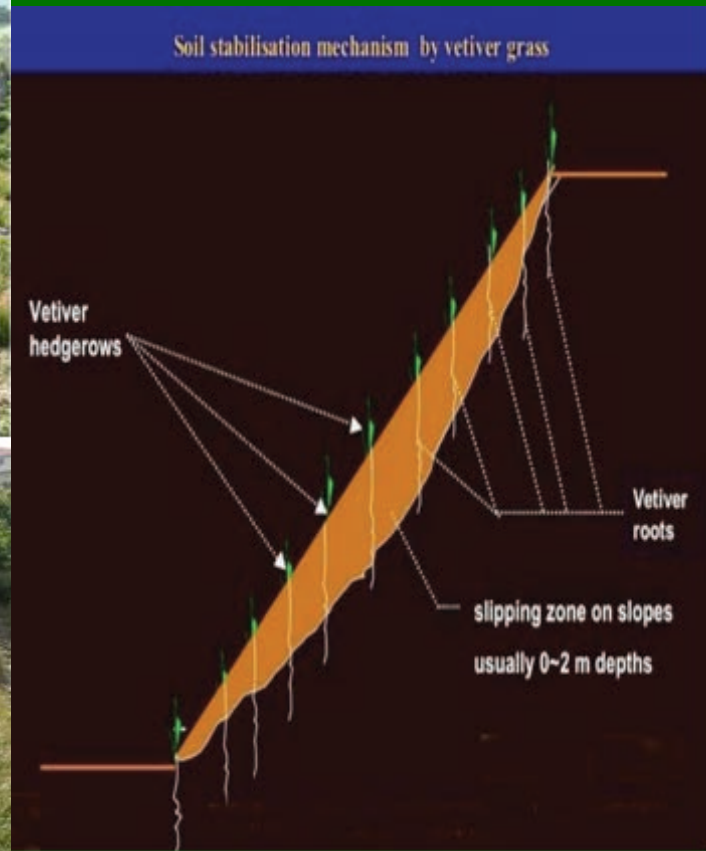
Viet Nam: Wave Overtopping Simulator Tests - Vetiver grass could suffer a maximum wave overtopping discharge of up to 120 l/s per m.



Protection of Interfaces Between Dissimilar Materials



Slope Stabilization

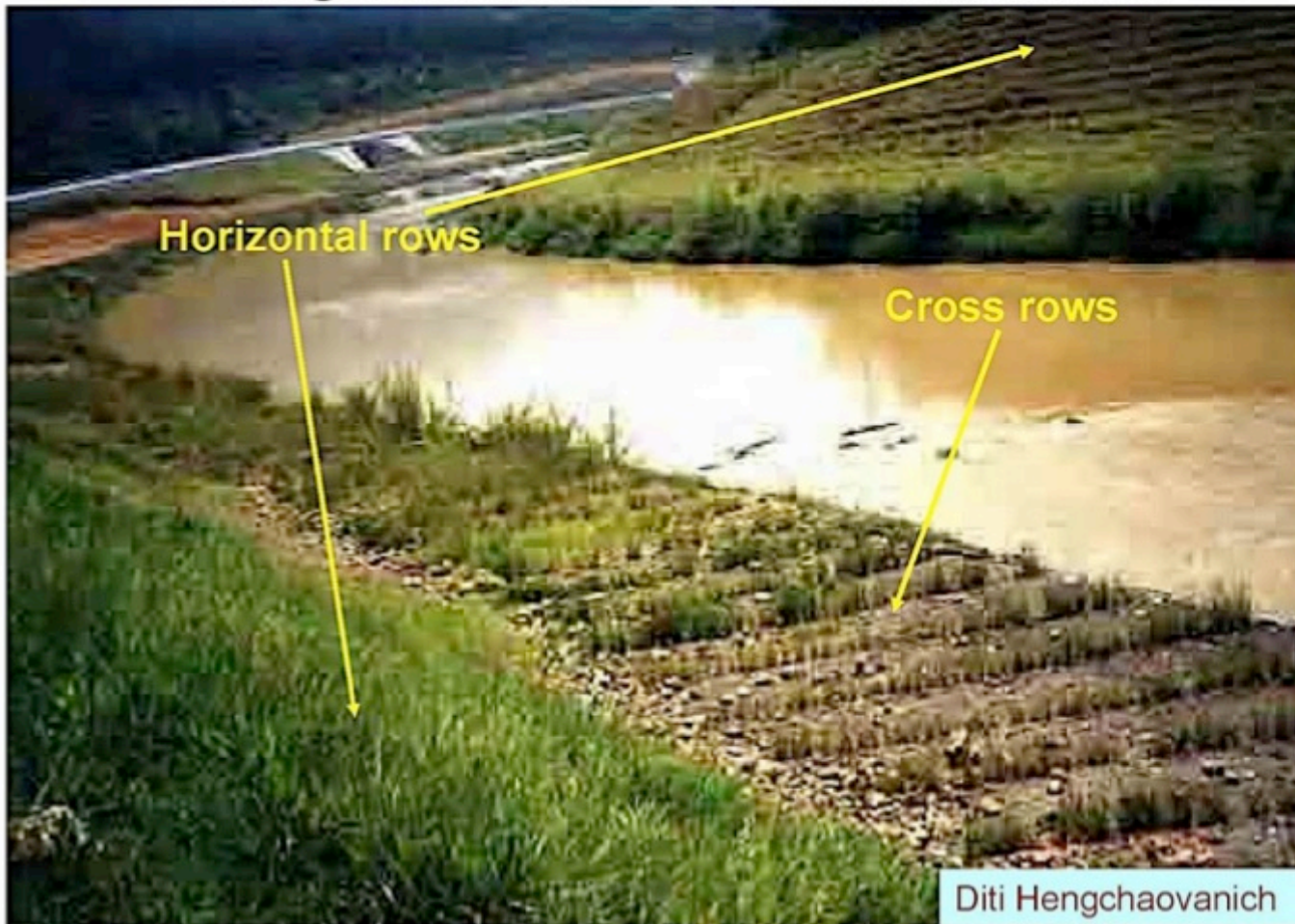


USA California: a farmer showed he could stop his slope slipping. Results after 4 years.



River Bank Stabilization

Malaysia: An outstanding success, several floods did not damage this river. Photo Credit Diti Hangchaovanich



Others: Fodder & Thatching



Karnataka, Mysore District: farmers have been using Vetiver for generations for fodder

Venezuela: Vetiver roof thatching



Others: Mulch



Congo (DRC): Vetiver hedgerow & mulch w/pineapple.



VS Applications: Climate Change Adaptation & Enhancing Resilience

- Two “types” of adaptation:
 - Autonomous: adaptation that farmers, groups, communities can make privately.
 - Planned: thru govt. actions & spending with the goal of enhancing the capacity of populations to adapt.
- VS greatest strength for CC adaptation = tool people apply themselves...gives them capacity to respond to risks posed by CC.



VS Applications: Enhancing Adaptation Capacity & Resilience

- Enhancing people's capacity to adapt is a considered one of the top priorities for responding to climate change...VS can do that.
- By using the VS, individuals and communities increase their resilience in the face of CC...another top priority for climate change response.



VS Applications: No Regrets

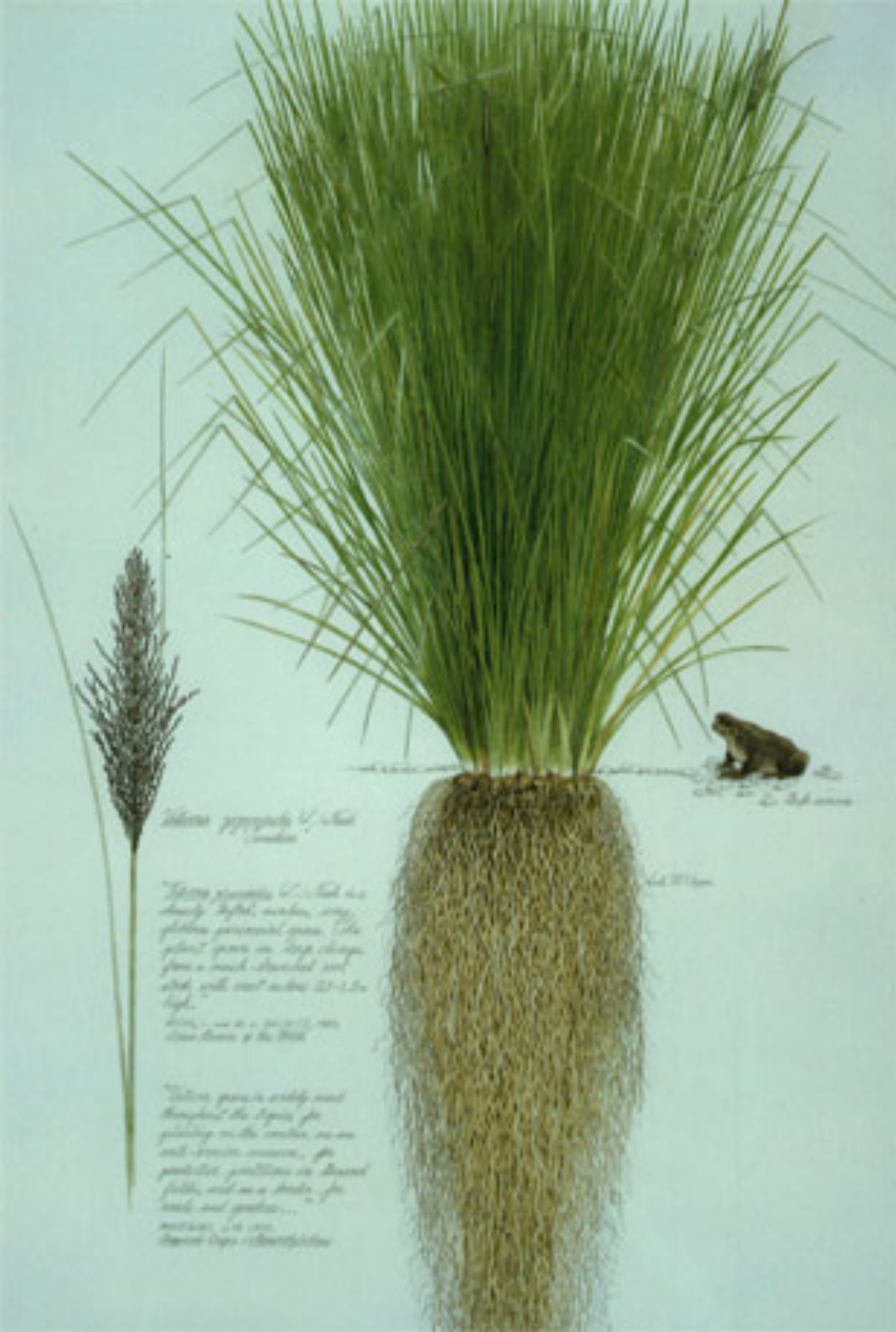
- Systems that can effectively cope with existing weather variability will be more successful in adapting to future climate change than those that cannot.
- Even in the absence of climate change, anything you do with Vetiver is going to help you given current climate.



VS For Mitigation

- High importance of better understanding VS potential for mitigation
- Prioritize climate change adaptation:
 - Mitigation financing uncertain
 - Where adaptation presents the opportunity to leverage additional benefits from mitigation, it would make sense to do so.
 - Many VS applications can have mitigation benefits





Thank You!



The Vetiver Network International
Proven & green environmental solutions