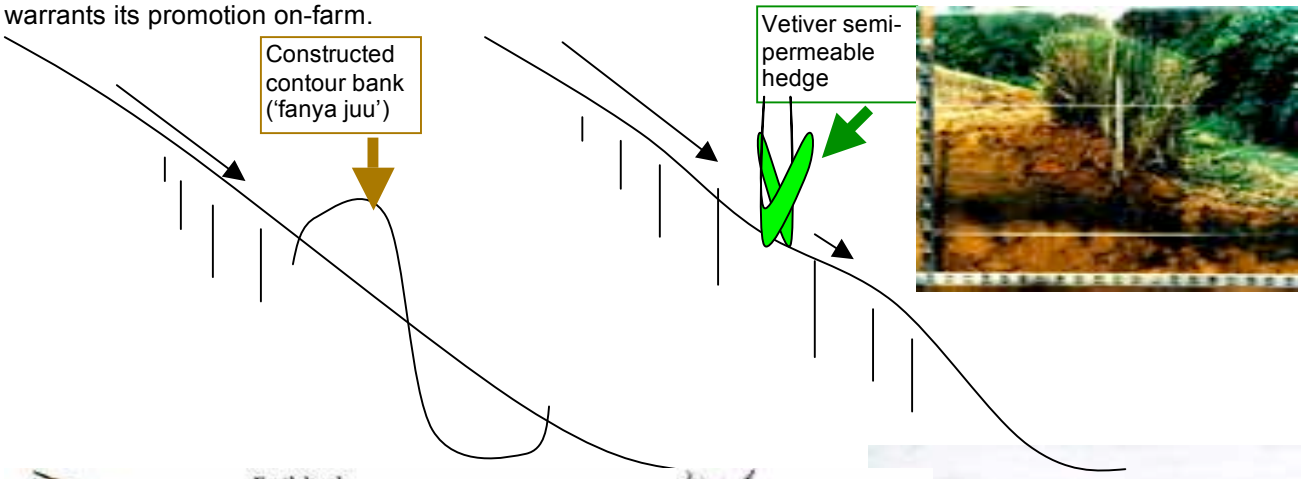
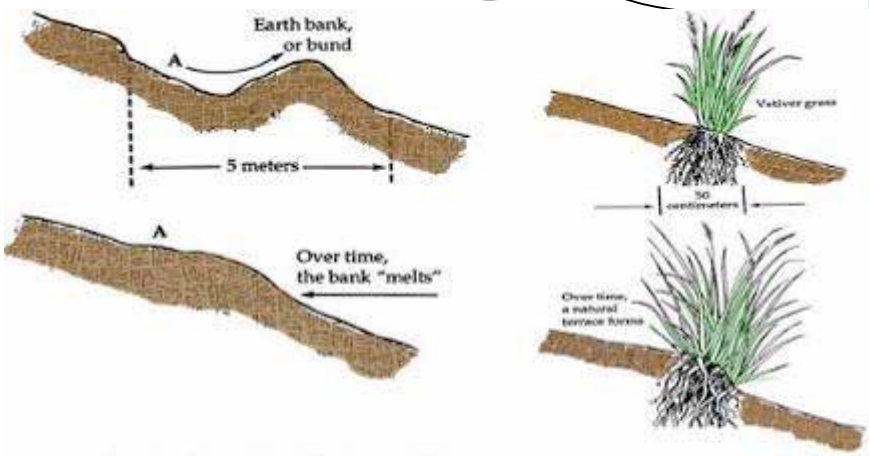
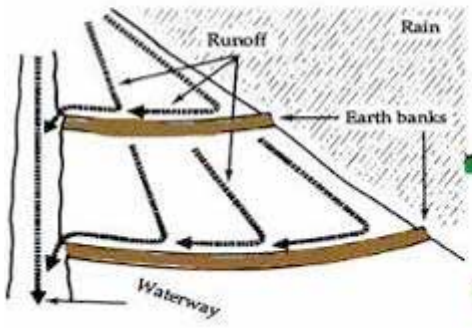
Comparing constructed contour banks with Vetiver hedges

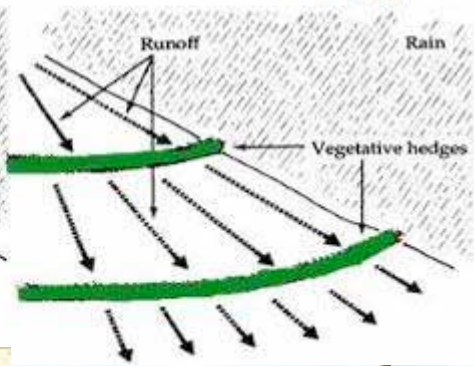
The constructed system of soil conservation was designed in the 1930s for low rainfall areas in the USA that had been over-cultivated and had started to 'blow'. They were designed to handle 300-500mm of *annual* rainfall, and not intended for the tropics! They are entirely the wrong system for high rainfall areas.

The constructed system for soil or moisture conservation has no place in the subsistent tropics, for a start it is un-natural, soil structures cannot withstand tropical storms and have to be rebuilt at great cost to the farmer. Over time they cause more erosion than they prevent. Constructed banks 'sit' on the ground they are made on, they are not anchored like vetiver hedges and consequently can be easily breached and destroyed. And, reinforcing contour banks by planting vetiver hedges *on top* of them can only be described as totally nonsense. Below table summarises reasons why the constructed system does not work in tropical, subtropical and semi-arid areas, and why Vetiver hedges offer the best alternative; the combination of its excellent performance for soil & water conservation and its added values warrants its promotion on-farm.









The bank was broken (left), and soon the gully developed (right).

	Constructed contour banks	Vetiver hedges
Cost: Labour & expertise	**ESTABLISHMENT** - requires (training on) proper contour measuring (use of hand-level or A-frame), possibly by an engineer to get levels correct, and banks to spill into safe outlet - is laborious, time consuming, particularly hard when the subsoil is compact/dry: it needs earth moving equipment, and labour & plants to vegetate the banks **MAINTENANCE** - is much more laborious; over time the banks 'melt' and need reconstruction; the average subsistence farmer can not afford this (field evidence!). If not maintained: increased risk of breaking.	**ESTABLISHMENT** - relatively easy in rain fed farm condition (with reasonable rainfall no watering needed) - no need to exactly follow contours, hedges cannot break (straighter lines, easier contour ploughing) - propagation takes time and planning initially, but with a first hedge is well established, planting material can be removed from there **MAINTENANCE** - decreasing with time: once established, pruning starts after about 1 year; for fodder production regular pruning required (every 4-8 weeks), otherwise pruning frequency can be twice yearly
Farmers' cost/ benefit: land, soil & water, crops	**WATER** - accumulation above the structure (if 'fanya juu') can benefit the crop nearby, but with heavy rains excess water is diverted off the farm, and soil carried along with that and excess water not given a chance to soak into the soil for benefit of the crop - if in excess, water is held in 'puddles' (if 'fanya chini'), out of reach for the crop - accumulation from heavy rains causing structures to break; contours typically are not exact, top of constructed banks never stays 'level', always a low point for water to top over and destroy the whole system → crop damage, gullies, topsoil loss. **SPACE** - earthen structures are up 3-5 metres wide, taking land out of production - drains also require (farm) space - drainage requires consent of neighbouring farmers to have diversion banks run through their farms to a *safe* outlet - sharp contour bends are a nuisance for animal or mechanic contour ploughing, further undermining productive space. **FERTILITY** - is taken away from the crop, to construct, as less fertile sub-soil is often hard (fertile topsoil is more easily available).	**WATER** - semi-permeable Vetiver hedges will: i) slow down water, **accumulating and re-distributing water above the hedge** ii) **withstand extreme water flow**: the stems can bend but not break, and the massive root system ensures anchorage iii) allow water to pass through the hedge at slower speed, spreading it out over the slope iv) Unlike other plants, Vetiver creates over time its own terrace riser → gradual slope decrease → decreased acceleration of water between hedgerows and thus decreased erosion. → **more infiltration above *and* below the hedge** → **higher yield, less vulnerable to drought**. **SPACE** - no drains (space) required: excess water passing the hedge at slower speed, thus also enhancing infiltration below the hedge - where farms are very small in size (e.g. in Kisii) the hedges can be established on farm boundaries instead of following contours - hedge width is 1-1½m; crops can be planted closely along the hedge **BY-PRODUCTS** i) mulch, windbreak, better farm micro-climate ii) harbouring predator insects to improve the balance in no-till situations (reducing pests) iii) pulling 'Chilo' stem borer away from maize iv) off-farm: fodder, handicraft, thatch, ropes.
Watershed cost/ benefit:	**EXCESS WATER** - accumulated from earthen structures into drainage, when allowed to speed down 'un-checked', exacerbates gully formation and **flash floods**, damage to infrastructure - needs safe outlet, often construction of waterway - the most vulnerable part of the system (usually running straight down, prone to gully erosion - must never be cultivated or they will erode faster) - if not given a chance to soak into the soil, it will not contribute to aquifer recharge.	- increased infiltration contributes to: i) groundwater recharge ii) reduced gully formation iii) reduced excess water mitigating flash floods, and related damage to crops & infrastructure.
Conditions critical for adoption	- contour measuring skills & instruments - planting material for the banks - initial labour investment is constraint	- understanding how VS works (contour measuring skills are not critical) - multiplication, establishment (design) and maintenance: know how