The ‘Hydrologic Corridor’ mobile installation Peter Westerveld 2014

Peter Westerveld was devoted to moderate climate extremes by large scale and sustainable re-greening of the landscape. Besides the field implementation in Kitenden, Meshanani and other sites, he expressed his ideas of the ‘Hydrologic Corridor’ in a mobile installation. It is a three-dimensional display of Peter Westerveld’s views on the chain reaction of energy and water. The spinning of the bamboos and panels symbolises the turbulence of the cooler humid air mixing with the hot air of the predominant sea wind resulting in a more distributed rainfall.

The Hydrologic Corridor

Re-greening sides are strategically situated as a funnel and are developed around major problem areas. Each bamboo is reflecting the area for natural re-greening from the Indian ocean to the Kilimanjaro and each panel provide information on the project sides: google-earth images indicating the location, photographs demonstrating the situation and problems and drawings expressing the desired water system around infrastructure, vegetation in soil and atmosphere.

Peter uses the bamboos also as typical cases to explain a variety of technics, processes, and concepts from various geographical and time scales. The text written on the black passe-partouts around the images are explanations, calculations and instructions for constructions. You find them in the paragraphs below. The figures relate to the pictures the text written around, from left to right 1, 2, 3, 4, 5, etc.

The complete explanatory of the 22 panels and the 6 bamboos from the Indian ocean to the Kilimanjaro:

- Sala Tsavo East
- Sala Tsavo West
- Aruba Bachuma
- Tsavo Triangle, Rombo
- Mberikani
- Amboseli

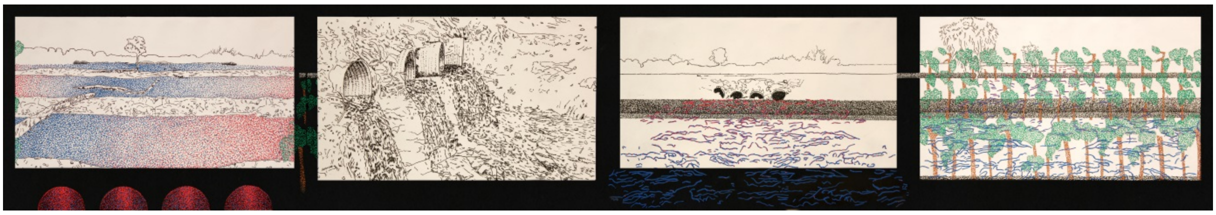
Bamboo **SALA TSAVO EAST**

Sala Tsavo is the most eastern area of the Hydrologic Corridor under design by Peter Westerveld. It deals very much with erosion problems around drifts and culverts of road crossings near the Galana river and the possible solutions by the use of (cross) contour trenches. Peter also warns for the impact of climate change on storm water and the infrastructure is explained in relation the effect of re-greening for soil and climate.

Sala Tsavo 1a

Sala gate:
1,2,3,4 (1)High velocity runoff water, diminishes the still remaining vegetation cover. (2) The runoff water flow concentration into four metal culverts, accelerates the intake even further, (3) speeding up discharge, to the extent of ever deepening soil erosion, in further acceleration of runoff water flows, (4) both at the intake and the drainage site into Galana river. Contour-trenching and cross-contour trenching are supposed the guide the streamlines and store peak flow for infiltration and delayed underground passage.

Sala Tsavo 1b

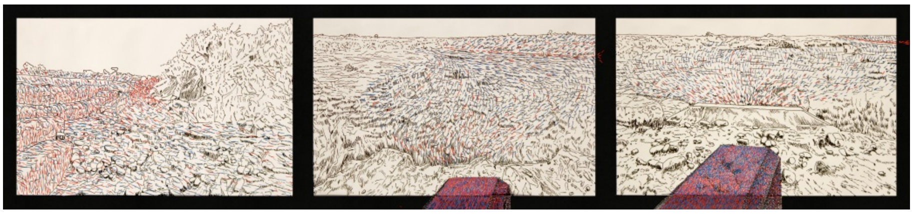


2 The necessary culvert flow concentration under the road reserve and consequent drainage acceleration thereof, is neutralised by the interconnectivity of the contour trenched intake trajectory and a double contour trench volume in the field of final infiltration, with the excavated soil deposited at the centre, in between the two paired trenches, dictating a double overland sheet flow.
4 Contour trenching of the degrading intake trajectory, prevents erosive flow concentration, while temporary high density Jatropha seeding along the trenches, further decelerates runoff water, permitting indigenous regeneration.

Sala Tsavo 2a

1,2,3 (1) Smooth concrete culvert systems accelerate the runoff water intake in congruent speeding discharge, terminating (2) affected vegetation cover, opening the way for unabating erosion. The denudation of a mis designed and badly (3) positioned road reserve and the frenzied runoff water thereof, destabilises regions up to their surrounding top contours.

Sala Tsavo 2b



1 Erosive road reserve runoff speed, further accelerated by drop velocity thereof.
2 Congruent discharge acceleration.// Speeding drainage upto the top contour.
3 Smooth concrete velocity increase. // Denuded road reserve runoff acceleration.

Sala Tsavo 3a

Tsavo-Sala (7, 6, 5, 4, 3, 2, 1) (1)Terrestrial propelled oceanic atmosphere warming, enforces increasing vapour saturation for sufficient cooling, ending in increasing rain storm volumes, only requiring some degrees temperature decrease for instant and consequent torrential discharge.// Contour trench transfer drainage water from one basin to the next.
2 Existing infrastructure unable to accommodate these progressively expanding rainwater volumes, has to be modified by atmospheric rainstorm scattering, sub surface water storage, triggering evergreen vegetation rejuvenation, slowing discharge from amended discharge configuration.// Added drainage basin featuring 10 points of discharge// Single drainage// Original drainage basin with a single drainage.
3,4,5 Major seasonal river origins, to be cross-contour trenched, to permit subsurface water infiltration, triggering automatic evergreen afforestation, provoking pre-saturated precipitation, slowing drainage in perennial river systems, from contour trench added subsurfacely stored water volumes in slow discharge to the major river bed.// Excavated soil disposal// Contour trench excavation.

Sala Tsavo 3b

1,2,3 A brand new, super smooth, concrete culvert, river crossing, did not survive the first rain season it was subjected to. Nor did an upstream, adjacent concrete drift, since the damaged culvert bridge was left in place, hampering smooth drainage of the floodwaters from overloaded rainstorms, generated by oceanic atmosphere warming, requiring extreme vapour loads for saturation.
4,5 When runoff water from the road reserve tempts to cross river water in flooding, turbulence excavates drainage channels on both sides, where concrete ends in soil, adding to the unleashed, chaotic discharge pattern. The smooth drift surface accelerates water transmission of the upstream flood water in erosive pattern, in equal damaging transfer into the downriver drainage.

Sala Tsavo 4a

1, 2, 3, 4 The chaos of dysfunctional and contra productive concrete culverts, gabions and washed out elevated infrastructure, (2) crossing the seasonal river bed, justifies the removal of this non entity, to be replaced by a concrete drift, while the debris of the road (3) reserve such as the stone fill of the gabions and the smashed concrete from the culverts, may be used to construct a shadow, (4) rough stone cyclobe concrete drift, neutralising water velocity increase from the smooth one.

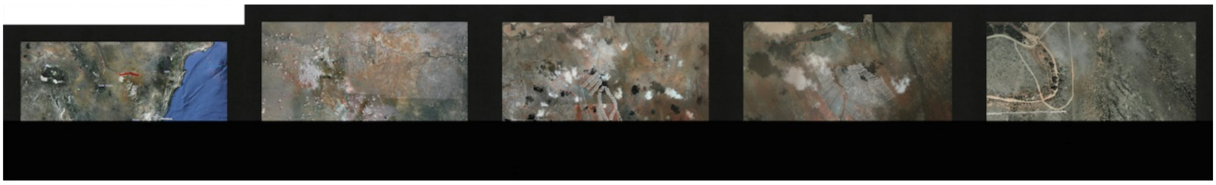
Sala Tsavo 4 07

1,2,3,4 The removal of all infrastructural rubble and substitution with (2) a smooth concrete drift for easy traffic passage in conjunction with a rough stone cyclobe concrete one, the river water will return (4) to its original, wider flow pattern and bed, in unhampered and non-obstructed discharge into the perennial accommodation of the Galana River,
in regained benevolent nature.

Bamboo **SALA TSAVO WEST**

The Sala-Tsavo and Aruba Bachuma infiltration units form the hydrologic entry for rain storm collection and subsequent scattering thereof for further transmission to the eastern hinterland. It drains the Voi and Tsavo rivers into the Galana. (Cross-)contour trenches are relevant close to river beds and floodplains in order to protect culvert and drifts. Intake basins must be contour trenched for subsurface water storage, permitting tree rejuvenation, to cool atmosphere disturbances, pre-emptively scattering rain storms, providing benign precipitation, to permit shallow rooted soil cover protective restoration. Jatropha is presented as ideal pioneers crop breaking the soils and protect soil surface at the same time.

Sala Tsavo 6 a



Sala Tsavo 6: Sala Tsavo – Aruba Bachuma
1 The Sala-Tsavo and Aruba Bachuma infiltration units form the hydrologic entry for rain storm collection and subsequent scattering thereof for further transmission to the eastern hinterland.
2,3 (2)The East Westerly configuration of the Sala Tsavo unit is the axle geared to guide the long South-Easterly rain seasons, while the North-Southerly situated Aruba Bachuma unit is destined (3) to direct the short North-Easterly rain seasons in benign status further inland.
The Sala Tsavo 6 unit is projected to become the densely forested hydrologic conduit between the two.
3,4 (3)Mechanical soil compaction in the refilled erosion gullies followed by high density Jatropha seeding along the trenches and in the filled (4) gullies, will recreate deep soil perforation from the plant's deepening central root system, stabilise top soils from its horizontal root system and protect (3) automatic upcoming indigenous vegetation from excessive solar and wind erosion, since Jatropha grows more than a meter, under less (4) than 100mm annual rainfall, should contour trenching be applied beforehand at the lower contours, outside the seasonal river beds.
3 Cross-contoured river origins with excavated soil deposit in the erosion gullies between the trenches, will rectify the top contour erosive disruption, instigated by the bridge drainage obstruction near by the Galana River.
4,5 (4) Contour trenching adjacent to the lower and consequent deeper eroded seasonal feeder flows to the main river will simultaneously slow runoff water discharge into subsurface flows, to the extend that main river flows can be made perennial, when the subsurface water storage saturates Jatropha growth, exceeding several meters, features a central deep rooting system in equivalent length, permitting water infiltration beyond the central root system's depth, thus increasing the actual subsurface water storage capacity, permitting automatic dense and indigenous forestation. (5) The plant is drought resistant, non-invasive and poisonous for humans and animals, making it the optimum species for indigenous forest recovery.
5 Galana River 150 meter contour trench excavation 75 meter soil deposit

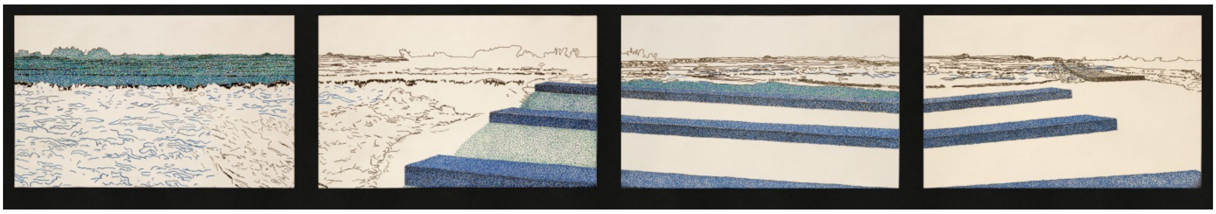
Salo Tsavo 6b

Sala Tsavo 6: Galana river Drainage
1,2,3,4,5 (1)All components surrounding this solid, now lone standing concrete bridge are in turmoil. High velocity (2) river water brought vegetation down from the 360 meter high land mass elevation, subsequently blocking the bridge's drainage capacity, (3) pushing the obstructed, however frenzied waters over the top of the bridge, where after the soils of the connecting dirt road (4) gave way, instantly accelerating the entire river drainage velocity, subject to the explosive tripling discharge capacity,(5) in crumbling erosive generation, from the river's catchment's top contour, only to be neutralised in Galana River's accommodation.

Sala Tsavo 5a

Culvert drainage into Galana River
1,2,3,4 (1) Subject to ever increasing rainstorm volumes, torrentially discharging in ever shorter time frames, due (2) to unabating and for that matter, increasingly thermal enhancing atmosphere discrepancies, caused by seasonal accelerating (3) deforestation and denudation; improperly drained flood waters thereof spill over in adjacent drainage basins, (4) generating rain seasonal aggravating erosive transmission.

Sala Tsavo 5b



Towards Galana river
1 Contour trenched slope - Evergreen vegetation - Surface water flow to drain towards Galana River - Subsurface infiltration - Subsurface flow obstructive depression.
2 Contour trenched slope – subsurface infiltration – evergreen vegetation - Termination contour trench deployment - Subsurface water flow
3 Hydrostatic pressure - Subsurface water flow - Surface water flow requiring (4) discharge regulation - Hydrostatic pressure
4 Hydrostatic pressure – surface flow – drainage velocity tempering - Drainage velocity tempering cyclobe concrete cum concrete drift towards Galana river

Sala Tsavo 7 a

1 Sala Tsavo 7. Flash floods, obstructed by road reserve elevations, featuring culverts from different configurations and dimensions, further hampered by gabion deployment, narrowing free, flow motion to comparably mere trickles, is a recipe for aqua energetic misconduct, destabilising the river from its top contour to the point of discharge in the Galana River.

2 According to the fine river sand grain, the clarity of the remaining flood water and the gentle slope of the catchment area, the destruction to the river crossing was man instigated, only executed by an obstructed misconducted water flow, in release of such force combination that the tonnage weighing culverts were pushed aside as if they were boats.

3,4 (3) The wide and long sandy river bed used to be the host for the fertile soils, necessary for plant growth. The cross contour trenching of this fine sandy river trajectory from the river's origin to the point of discharge, will bring the vegetation back in inter trench related expansion and long forgotten vertical tree rise from sufficient, (4) evaporation free subsurface water supply, in combination with trench trapped aquatic transported fertile soil and organic debris, holding biodiversity from the adjacent drier and higher grounds. Stabilisation of this river scar, by self-generative reforestation, consolidates both the soils and the vegetation of the surrounding dry lands, where slowing drainage, humidify conditions, in generation of recurring forest growth.

Sala Tsavo 7 b

1 Forest development from cross-contour subsurface water and silt accumulation. Trench excavated soil deposit.

2 Cross-contour trenched runoff river water infiltration and silt cum organic debris trap, entangling biodiversity. //Road reserve //

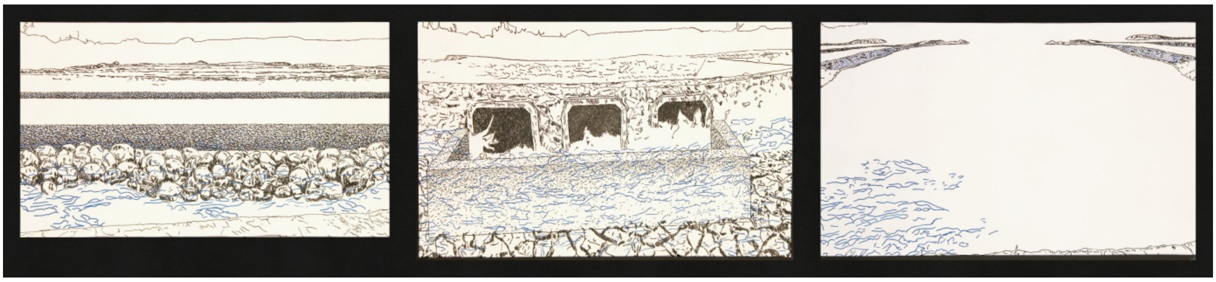
3,4 (3)Cross contour trenched runoff water infiltration // Silt laden river water// Rock and concrete road reserve debris, (4) brought in format for cyclobe concrete assembly.

4 Each variety in obstructive configuration, be it a gabion, a larger or somewhat smaller, smooth culvert, next to a rectangular one, sends a relatively gentle flowing, however expansive flood water volume, in an unpredictable although ever destructive disarray from sheer misconducted, voluminous pressure, send in both crisscross additional and contradicting energy directions. // Smooth concrete river wide banks including drift for traffic passage.

Sala Tsavo 8 a

1,2,3 (1) Healthy and proportionally rooted riverine shrub cover is uprooted and subsequently washed out by one flash flood, generated by bare land surface heat propelled oceanic atmosphere warming, in demand of maximum vapour saturation, disabling a climb in (2) landmass elevation, exceeding three hundred meters since this denudation process is here in its initial stage, remaining vegetation still functions as a net, holding washed out vegetation, in branched entanglement, still temporarily safeguarding runoff water discharge through the culverts. However, this erosion is progressive, both for the remaining vegetation and intermingling bare land surface, while atmosphere warming is (3) enhancing, accelerating the frequency of flash flooding, in increment of washed down soils and vegetative debris, jeopardising the culvert’s discharge capacity, with road surface inundation and wash out as a result. The smooth concrete culvert conduit, accelerates the discharge towards the Galana River, to the extend of final denudation turning into unabatingly aggressive erosion, bypassing the drainage status, up to the top contour of the catchment basin, a progressively disentangled energy transfer, threatening to wash out the infrastructure sooner than later.

Sala Tsavo 8 b



1 A 150 meter stonewall filter at the drainage side of the culverts, distributes the several meters wide drainage volume thereof, over a length similar to the stonewall, therefor not only reducing the culvert’s drainage speed, accelerated by the drop velocity of the concrete box at the intake, but also from spatial relaxation and subsequent drainage in all contour trenches of the unit, followed by progressive evergreen drainage speed reduction.

2 An open concrete box construction, mounted in overcapacity at the intake of the culvert system, prevents further erosion from stagnant flood water protection, releasing silt and captured biodiversity therein, enhancing subsurface water infiltration from extended surface water coverage, all boosting vegetative recovery and rejuvenation from mosses, grasses, shrubs and trees.

3 Enhancing atmosphere warming, temporarily neutralised by increasing vapour absorption, thermally cooled by enforcing landmass elevations, into solidly concentrated, down pouring water volumes, releasing all embedded energy in frenzied runoff trajectory, so powerful that relatively shallow rooted vegetation disappears, only to be stopped by additional deep rooting tree development to prevent progressive erosion.

3 The intake basin must be contour trenched for subsurface water storage, permitting tree rejuvenation, to cool atmosphere disturbances, pre-emptively scattering rain storms, providing benign precipitation, to permit shallow rooted soil cover protective restoration.

Bamboo **ARUBA BACHUMA**

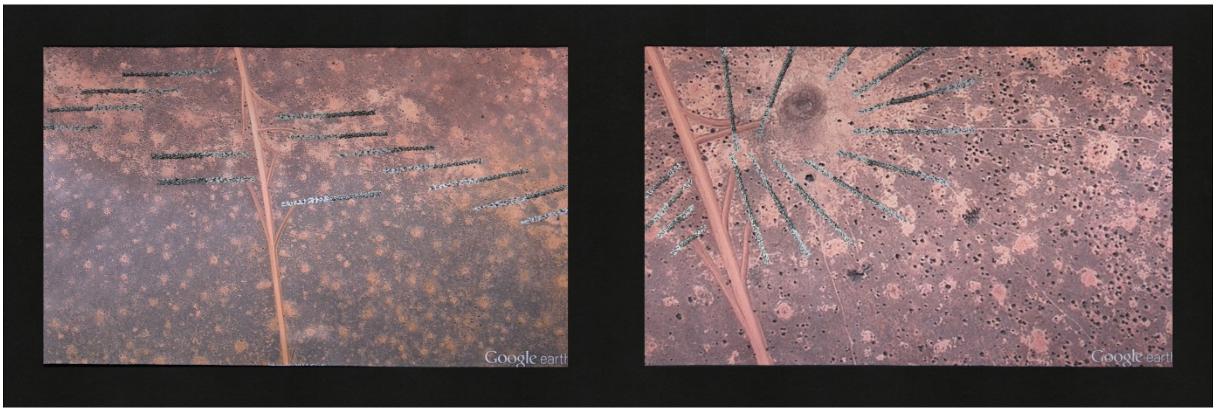
The Aruba dam is a natural depression in Voj river, between Taiti hilss and the Kililfi massif at the Indian ocean. Rainstorms in Voi shed cause temporary flooding the Bachuma road. Contour trenching in the area could stop erosion and bring the runoff underground for agricultural production and trees. Road construction should be tailor-made and elephant-proof. Again trenches pay an important role in surface ad subsurface water management and regeneration of the vegetation for soil protection.

Aruba Bachuma 1 a

1. The Aruba Dam Bachuma Road constellation bi-sects four major direct rain dependent drainage depressions, whereby the Aruba Dam is additionally fed by the seasonal Voi River, originating in the Taita Hills under severe erosion. Both the river and the 3.000 km2 catchment area, terminate in one and the same landlocked depression some 65 kms from Kililfi at the Indian Ocean. 1,2 billion cubic meters direct rainfall evaporates within two months each year, desertifying the are under diminishing shrub and grass vegetation, in bi annual reduction of the soil water infiltration capacity, prohibiting renewed tree growth.

2 Diminishing rainfall over the drainage area from vegetative depletion enhances terrestrial solar reflection and consequently daily temperatures in subsequent increment of evaporative cooling demand from the landlocked runoff surface water collective depressions, generating increasingly torrential rainfall and erosion both the Sagala Taita Hills and the lower situated runoff area concerned. Subsistence farming on the lower slopes of the Taita Sagala Hills makes provisional use of the runoff waters from the hills, however a further increment in torrenticity of regional rainfall threatens the local agricultural survival with seemingly unmanageable erosion.

Aruba Bachuma 1 b



Aruba Bachuma Dam
1 Contour trenched four way water collection and subsurface storage; twice from the road reserve, twice from the field’s top to bottom contour trajectory.

Contour trenching of the slopes agriculture subdivided in contour zones with permanent commercial vegetation and intermittent seasonal crop, doubles agricultural yield, terminates erosion, produces sufficient consumable water, while diminishing direct rain seasonal dependency through subsurface storage with in turn drains to the Aruba Bachuma constellation, permitting rejuvenating vegetation to take root.

2 Semi circular trench formation collecting road and field surface runoff water, in evaporation free subsurface storage, feeding a surface waterhole, through viscosity.

These Sagala-Taita water bodies draining to the Aruba Dam Bachuma road axle, will be met in trenched reception in the depression sectors adjacent to the road reserve, initially in formation of a slow downward moving, subsurface water wall thereof, consequently to be followed by a water dependent vegetative evergreen, forested fence formation thereon.

Aruba Bachuma 1 a (text in reverse orde)

3,2,1

3 Progressive atmosphere warming prohibits any free water flow obstruction, when concrete and soils are incorporated in the discharge channel. The prevention of any reduction in free conduit, others than an equal slowing of water velocity from rough surfaced friction permits the use of non-reinforced cyclobe concrete with sharp edged rockfill to discourage heavy weight wildlife intrusion thereon.

2 A rigid concrete construction obstructing the energy held in rapid free flowing water mobility, will backwash into the non-rigid soil foundation and intake channel, to release that energy in soiled fragmentation, breaking the heavy duty concrete as if it was an eggshell.

1 This frenzied, aquatic energy explosion first seeks its way out in vertical configuration, thereby confining liberating discharge in a thus excavated soil basin, which breaks at the weakest point, next to the rigid however chaotic damaged concrete construction, creating an erosive aquatic shock wave up to some sixty kilometres to the east.

Aruba Bachuma 2 a (text 1a continues at reverse orde)

8,7,6,5

8 The Bachuma infiltration axle is to become the major forested, pre-emptive unit for Indian oceanic rainstorms, entering Kenyan airspace at a distance of some hundred kilometres on an inland trajectory, passing the focal drainage depression for both runoff water volumes from the Sagala and Taita Hills. The majority of the latter’s runoff waters in easterly direction passes the Aruba dam, through the Voi River and northerly adjacent area. The Taita Hills feature erosion gullies up to 30 meters deep, with five nearby easterly rock outcrops with altitudes varying,

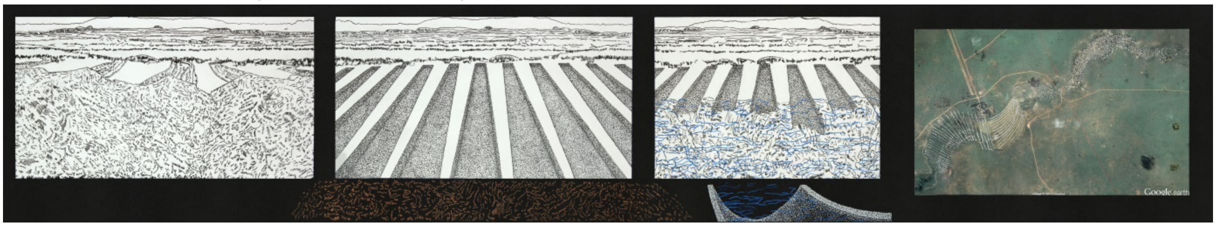
7 between 825 en 600 meters; as a sustained risk for aggravating regional erosion, should a rainstorm hit. Aruba dam, at an altitude of 430 meters receives both types of erosion and silted up, leaving a neglectable water retention capacity, in generation of a seasonal mudflow toward the currently final land locked depression. Mechanically scooping this former surface water body

is not only a costly operation as it addresses the local water supply for wild and birdlife only; erosion from the hills and adjacent south-south easterly lowland

6 is sustained and under the current atmospheric warming conditions, expected to exponentially worsen, in the short term. The recreation of a relatively shallow surface water body, subjected to aggravating upstream erosion, add to the adverse climatic conditions, as evaporation and siltation spiral, in conjunction with an ever decreasing downstream landlocked depression in search for retention capacity. Climate warming must be utilised to boost growth, perennial growth in the world's equatorial hemisphere, while carbon dioxide must be turned into the fertilizing component to fuel that growth acceleration, on condition that both components are properly accommodated and

5 inter related, not to be left in its sorrow, current, chaotic and therefor contra-productive constellation of destruction. The human effort to raise the spillway channel by a meter, with rockfill and gabions, proved to be an effort in futility since the river water flow just bypassed the installed obstruction, however should this minor effort have been successful, it would have added four hundred million litres water vapour into an already overburdened atmosphere.

Aruba Bachuma 2b (text 2a continues)



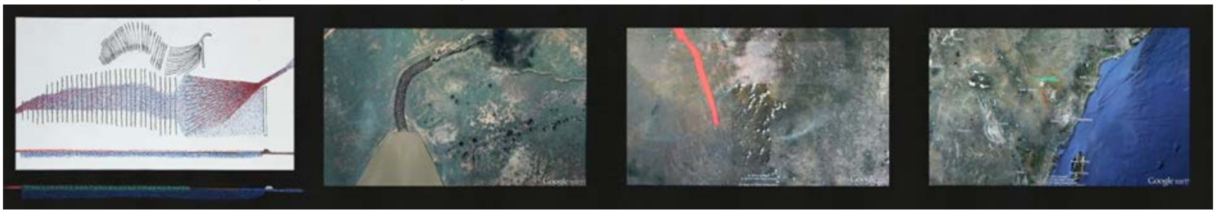
1 One meter deep trenches, covering the entire intake of the Voi river flood plain, focussed on the existing deeply eroded spillway channel, permits excavation to a depth of two meters at the point of discharge, accelerating flood water velocity from both spatial condensation and drop velocity, to enhance the erosive capacity for clearance of the trench excavated soil and previous river silt deposit for downstream repair. This aquatic soil excavation and transportation matures into a state of equilibrium, when the water intake equals the speed of discharge, from enlarging spatial relaxation, then the excavated surface water holding capacity must be kept silt free, through the excavation of contour trenches in the nearby upstream flood plain, to develop into an evergreen forested shrub and grass filter.

3,4 (3) The contour trenched evergreen forest filter doubles as the subsurface and therefor evaporation poor storage for the dam's surface water, through a subsurface influx, replenishing off take, by hydrostatic pressure from the slightly elevated (4) subsurface water body in underground connection with the surface water. Both the reduced surface of this water body, as the drainage of forest and soil cooled subsurface water thereof, grossly reduces evaporation and therefor atmospheric disturbance to the landmass elevations in westerly direction

//Excavated silt distribution annihilating river bed erosion//

3,4 Upon forest filter saturation, the eroded spillway channel must be brought to the required level and thereafter protected with cyclobe concrete, deepening the dam's holding capacity in extension of the surface water body, without enhancing evaporation from intercooling water circulation. The projected excavation for the Aruba-Bachuma infiltration unit will result in evergreen forested development, exceeding 1.850 km2 on the runoff depressions in the medium long term. Additional excavations on more elevated land surface, will considerably speed up this forestry development and diminish and subsequently terminate destruction from climate upheaval.

Aruba Bachuma 1b (text 2a continues)



Grand total mechanical excavation: 92.000 m3

1.1 Subsurface water volume, hydrostatically pressurised into surface water: 14 trenches in spatial focussed aquatic flow acceleration, with 1 meter additional drop velocity towards 3. the spillway. Volume of excavation: 63.000 m3

1.2 Evergreen vegetation, forestation//remaining silt deposit //surface water : Organic filter, 32 trenches, volume of excavation: 29.000 m3 (infiltration capacity per flood event)

1.3 Existing dam: rough stone cyclobe concrete spillway, length: 270m width: 40m

3 distance Aruba - Sala - Tsavo: 25 km // distance Aruba – Bachuma: 40 km

4 distance Aruba – Bachuma – Indian Ocean: 95 km

Bamboo **TSAVO TRANGLE – ROMBO**

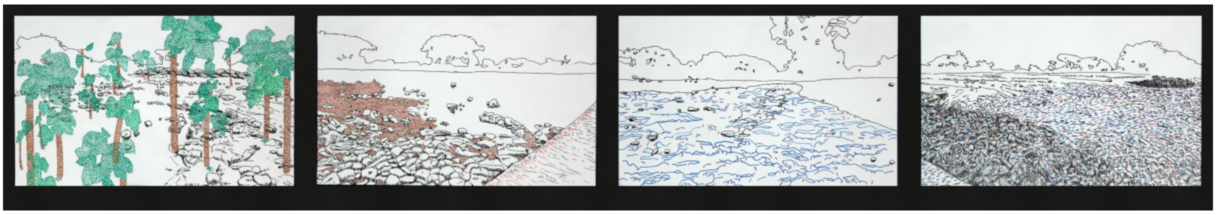
The Tsavo triangle between Mberikano and Rombo covers the plateau north east of the Kilimanjaro. Mberikani situated at the north-western side of the Chyulu Hills, dormant volcanic land mass elevations with heavy erosive floods into a flat bare plain re-greened by contour trenching. At Rombo forest at foothills of Kilimanjaro trees were destroyed for charcoal production threatening a proper water supply to the Mzima springs, so important for drinking water of Mombasa. Jatropha is considered as a good replacement f the poor irrigated and logging practices and forest may use an erosion filter in time. In the Tsavo Trinagle project implementation and agricultural production will attract many labour from the nearby Athi river, Mombasa-Nairobi Higway and Voi. Drainage water from the double cropped plateau will flow safely to the wild parks grace to the subsurface, vegetation-atmospheric cycle.

Rombo a

1,2,3,4 (1) Rombo is the drainage basin for the north-north easterly slopes of Mount Kilimanjaro and the south-south easterly Chyulu Hills range including (2) the Mberikani runoff extension from the north easterly Amboseli region. Forest destruction in the region started in earnest a quarter century ago. (3) Trees were destroyed for charcoal production, clearing the way for in many cases surface irrigated onion and tomato cultivation. Even (4) more severe was and still is the ongoing annihilation of the riverine forests, solely for charcoal production on a semi industrial scale to cater

1,2,3,4 (1) for urban conglomerates hundreds of kilometres away. Most rivers are consequently drying from uncontrolled rapid discharge, incapacitating (2) sufficient subsurface water percolation, in termination of shallow rooted fodder growth, diminishing already droughts, decimated pastoral cattle breeding, (3) which in turn makes the import of costly fossil fuel based fertilizers an urging necessity. The deployment of several meters wide, smooth (4) surfaced concrete drift, with on the left the muddy river intake and above the rocky outlet, only sustains heavy and fixed rock, is an indication of the omnipotent and destructive powers, that have been set free, in increment in the decade to come, by riverine forest depletion alone.

Rombo b



1,2,3 (1) Riverine reforestation with diesel oil and insect repellent seed producing Jatropha, nurtures the tranquillity for the re-establishment of (2) previous indigenous forest, in simultaneous provision of a genuinely renewable energy source, invalidating renewed forest destruction for charcoal (3) production, in generation of frequent recycling precipitation, sending agricultural surface irrigation demand to the archives. (4) Burning bio-diesel sets carbon dioxide free to be captured as a fertilizer by the next seed generation, nurturing progressive atmospheric carbondioxide reduction from indigineous forest re-establishment, while the bi-produced insect repellant vapourizes tick fever and malaria as just two endemic pests.

1 A rock barrier crossing the river bed, assembled with stones in oversize of the ones remaining in the outlet, will further deposit silt, enhancing water infiltration and bio-diverse reinstatement, which can be accelerated with high density, direct Jatropha seeding of the river bed, the banks and runoff land surface, in pre-rain seasonal extension, growing into a several meters high fine forest filter in some years to come, further decelerating the runoff velocity.

2 Silt is an energy absorbent, nutrient distributive source enabling the re-carpeting of eroded river beds, on condition that the water velocity is being tempered into a depositing mode, terminating the erosive one, permitting renewed water infiltration and subsequent biodiversity deposit into the previously eroded rock depressions, stimulating vegetation and forest growth from frequent runoff infiltration.

3 This gently flowing aquatic energy bolstered by the rough stoned slowing intake, up to the top contour of the river, consequently permit an increased surface water infiltration and fertile soil deposit thereof, regenerating fertility in the entire upstream trajectory re-instating vegetative growth, since fertile soils infiltrated by enhanced subsurface water circulation directly translate into evergreen growth.

4 A rough stone cyclobe concrete drift, made with larger stones, embedded in the river bed, banks and adjacent runoff land surface, connected to the smooth surfaced concrete drift, slows the water intake, enforcing silt deposit therein, into the depressions, left from rough stone removal and collection thereof, permitting vegetation to recuperate in the fertile soil deposit.

Tsavo Triangle a

1 Due to the impressive drainage capacity the Chyulu Hills have on Tsavo West National Park, the Tsavo Triangle up to the Tsavo River as the south boundary, the Triangle's healthy shrub vegetation and riverine forests along the Athi River, dictate manual excavation, enhancing surface water infiltration, not mechanised earth movement, in order to safeguard the vegetation's survival, adjacent to the eroded drainage network. An abandoned field camp near Tsavo River, previously housing the road construction company labourers for the Nairobi – Mombasa highway, can accommodate casual labour derived from Voi town, further south, to take care of the 35 square kilometres southern halve of the Triangle's infiltration unit, while labour for the northern half can be recruited form the adjacent Mtito Andei town, permitting daily home transfers to and from the excavation works.

2 Hiring younger labour force from the two main agricultural conglomerates of the region, not only provides labour opportunity to the grossly unemployed workforce, it simultaneously introduces the knowhow to convert agricultural land into drought resistant production furnishing the capital earnings to finance communal domestic implementation of the subsurface water accumulative technique. The pronounced public profile of both agricultural centres along the busy Mombasa-Nairobi-Kampala highway, in conjunction with the regional implementation, both inside the National Park and surrounding agricultural land, will provide a free of charge learning curve promotion towards the coast, up country and beyond to the international community.

3 Deployment of sufficient surface water, through one meter deep soil perforated subsurface water accumulation in the National Parks, wildlife and nature reserves, not only provides free reforestation and vegetative rejuvenation, with increasing species diversity and quantities as a result, the additional food production coupled with diversified surface water distribution, terminates the human-wildlife conflict. The capital reservation of fourty two million Kenyan shillings, invested in manual labour, executing the excavation in the Triangle, is an indirect investment in the agricultural regions north and southwest of the park, adjacent to the Chyulu and Taita-Sagala hills respectively. Subjected to physical requirements, farmers operational at

the higher contours of these agricultural regions, should initially be recruited, since contour trench excavation must always be top down implemented, to curb existing erosion and avoid the reception of siltation thereof.

4 In that context labour force can be top down circulated, supervised and design assisted, to bring their respective farmlands cooperatively in order, in simultaneous distribution of consumable surface water, not requiring any mechanical equipment, demanding maintenance, only following the law of hydrostatic pressure, funnelled in piped conduit, for sanitary purpose. One single investment to rehabilitate a wildlife sector, recycled into evergreening farmland, doubling yield, simultaneously stabilizing rain forested landmass elevations, all draining peacefully, back into the National Park, propelling forest growth on thousands of square kilometres, regulating and revamping frequent precipitation to ever increasing and rejuvenating biodiversity.

Tsavo Triangle b

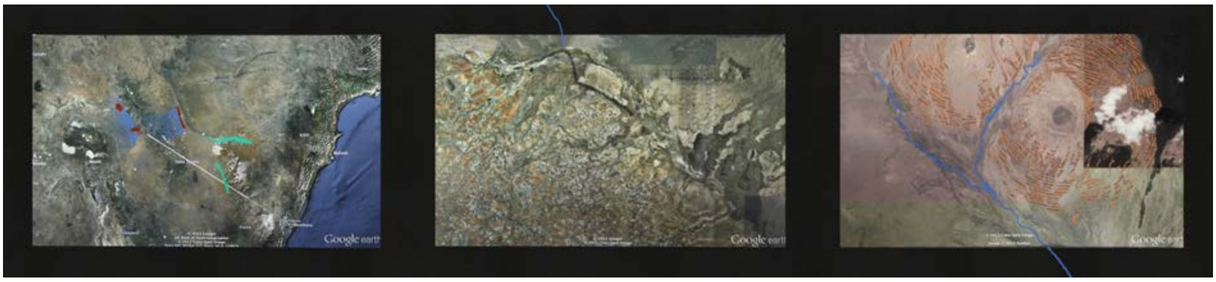
1 The Tsavo Triangle features eight major seasonal rivers, crossed by a dirt road infrastructure, adding and unintentionally coordinating erosion in the river depressions, in consequent reduction of subsurface water infiltration and storage required for forest development. The aquatic infrastructure, progressively subjected to flash floods, is more and more a channel of rapid drainage and is eroding the predominantly shrub vegetation and anchoring soils, in runoff water transmitted biodynamic discharge into the Athi River, finally choking the Malindi coastline. Rainfall as the condition for all life on earth, has thus become the lethal means of destruction and desertification, beyond regional boundaries, as the currently crystallising collapse of the Tsavo Triangle will further drain the lava, sustaining the Chyulu Hills rain forest some thirty kilometre to the west-northwest, already under de-hydrative threat from vehement denudation for subsistence agricultural

2 practice north of the National Park. Restoration of the aquatic surface-subsurface and atmospheric infrastructure predominantly brought in disarray, from forest depletion for railway construction, locomotive propellant, hardwood extortion and agriculture, must bring the sequential order of surface water, percolating into subsurface collection, to evergreen vegetation into forestation, in generation of regional recycled rainfall, with additional pacified reception of oceanic vapour flows. When aquatic reception supersedes regional discharge, vegetation and forest growth successfully conquer and ultimately defeat desertification, transmitting solar heat and radiation into evergreen canopy, terrestrial cover and daytime temperature reduction, boosting bird-, aquatic, wildlife, livestock and cattle into unprecedented and irreversible prosperity and growth.

3 The contemporary abundance of disentangled solar radiation and heat, coupled with the free for all, fertilizing atmospheric carbon dioxide in conjunction with the dilapidated terrestrial state, all over the world, triggers a growth potential quantitatively belittling the long gone dinosaur dimensions, should the vegetation and soil destructive vapour usurpating oceanic rainstorms, be put to order, by a human made, subsurface water infiltrative and restoring cycle. The current existing volume and trajectory of regional erosion, are the obvious indicators of the growth potential and pattern a region has, should erosive runoff discharge be put in subsurface - vegetative - atmospheric cycle, diminishing surface discharge to mere trickles, simultaneously providing the atmospheric conduit, beneficiary to adjacent, inland infiltration units, fisheries, agroforestry and landmass elevations.

4 The Tsavo Triangle infiltration unit will feature all the necessary characteristics such as being the hydrologic intake from the Sala Tsavo and Aruba Bachuma units at a distance of respectively 25 and 55 km in oceanic direction, the atmospheric vapour transfer to the Chyulu Hills rainforest, 35 km to the west and to the Rombo unit just of the Chyulu's, at a distance of 50 km from the Tsavo Triangle unit. The projected infiltration unit is situated, adjacent to the discharge into Athi River, enabling sufficient accumulation of the Triangle's runoff rain water volume, estimated at 200 million cubic meters per annum. Part of this 200 billion litre volume is sufficient for natural contour trenched forest development in the 70 square kilometres infiltration unit, with backwashing vegetation and forest cover towards Tsavo West National Park thereafter. This forested subsurface stored water catchment wall, double functions in the water retention of the Chyulu Hills rain forest. The atmospheric transfer of precipitation towards the hills will become tranquil and more frequent, while the subsurface stored water wall will slow drainage from the hill's volcanic soils, into a increment to the Mzima Springs. The springs feed the major piped water source to amongst others the coastal town of Mombasa.

Mberikani 1a



1 Chyulu Tsavo East drainage, Tsavo Triangle// Mberikani, Rombo, Kilimanjaro-Chyulu drainage// Mzima Springs – Mombasa water pipeline

2 Evergreen agriculture from contour trenched river water retention, Total length 11.25 km, Trenched distance 45 (incl), Perennial runoff water, Mberikani infiltration filter unit, Contour trenched river bed, 250 trenches 150m x 4m wide = 150.000 m3 per flood event

3 contour trench, trench excavated, compacted soil deposit, perennial runoff water

Mberikani 1b

1,2,3 (1) Mberikani situated at the north-western side of the Chyulu Hills, dormant volcanic land mass elevations, accelerating (2) the erosive runoff annual rainfall, with an estimated volume of one hundred fourty million cubic meters, of which ten percent consists of direct rainfall on this relatively steep sloped, eroded and therefor runoff accelerating volcanoes.

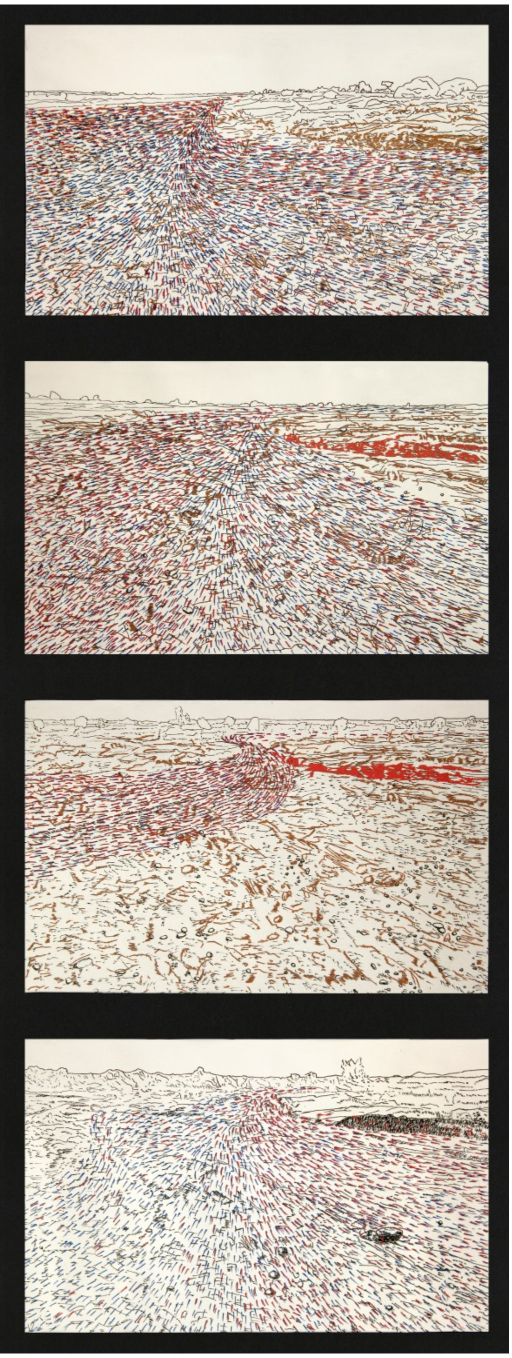
1,2,3 (1) The volcanic propelled, regional runoff acceleration, is reflected in extending tree devoid land surface, progressively interspersed by bare soil (2) trajectories, unable to even sustain grass cover, further incapacitating surface water infiltration, invisible erosive transmission to the projected Rombo (3) infiltration and filter unit, some 45 kilometres to the south-east and beyond threatening to choke the Mzima Springs, Mombasa's major consumable water supply.

Bamboo **MBERIKANI**

Mberikani situated at the north-western side of the Chyulu Hills, accelerating the erosive runoff annual rainfall to the infiltration and filter unit of the Mzima Springs, Mombasa's major consumable water supply. The newly constructed Tarmac road connecting the Amboseli-Kilimanjaro region with the Mombasa-Nairobi-Kampala highway, (2) is threatened by flooding and erosion. On the plateau some depressions occur (Risa1,2,3) with seasonal water only. Subsurface storage by top contour trenching for perennial water provide local re-greening and disconnection of climate extremes upto central Africa.

Mberikani 2a

Mberikani 2b



Mberikani 2a (left)

1 Top contour

2,3 (2) Contour trench excavation at lower contours slows the runoff at higher contours, terminating erosion or erosive potential, while subsurface back washing of these trenches reinstates vegetation cover at higher altitudes, whereas an increase in (3) contour trench excavation considerably accelerates evergreen vegetation recuperation, should this be commercially desirable.

3,4 (3) The distance from the top contour to the location where soil erosion occurs, together with the slope elevation thereof, is the decisive factor for the amount of contour trenches to be excavated, determining the amount of dense Jatropha hedge, filtering velocity decelerators on both sides of each trench, have to be planted to terminate and/or prevent (4) sustained soil and vegetative erosion up to the top contour.

4. Mberikani 2 Silt organic debris catchment at lower contour. The distance from the contour trenched location to potentially recurring erosion at lower contours is determined by re-accelerating runoff water velocity from the existing slope elevation, together with the local vegetative and soil conditions, requiring a repetitive amount of contour trench excavation and dense Jatropha hedge seeding.

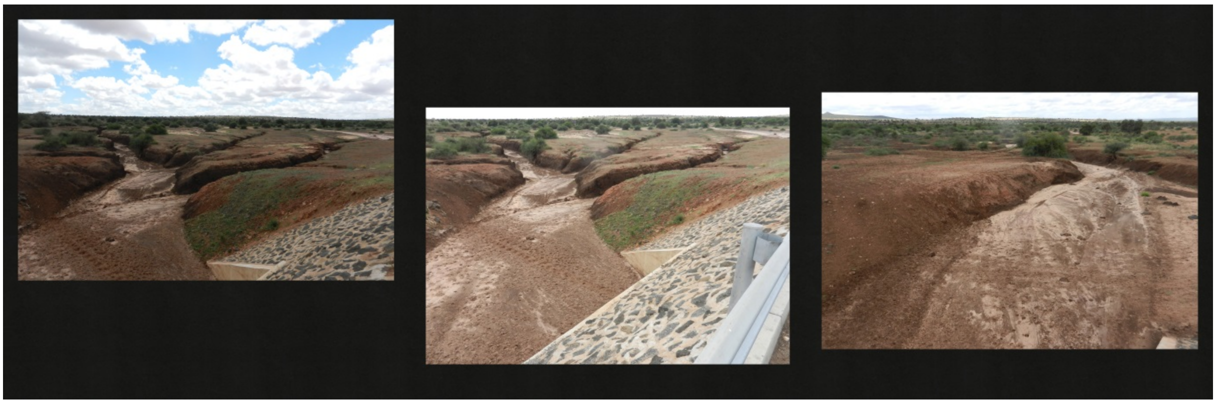
Mberikani 2b (right)

1 Top contour

4 If erosion at lower contours is left untreated, it creeps to higher contours from dislocating energy transfer, while additional drop velocity, generated by this erosion, transmits into accelerating erosion at lower altitudes in mutual erosive cross acceleration thereafter.

1,2,3,4 (1) Dislocated erosive energy (2) Dislocated erosive energy transmission from lower contour under erosion (3,4)Dislocated erosive energy transfer from lower contour under erosion (4) Erosion at lower contour.

Mberikani 3 a



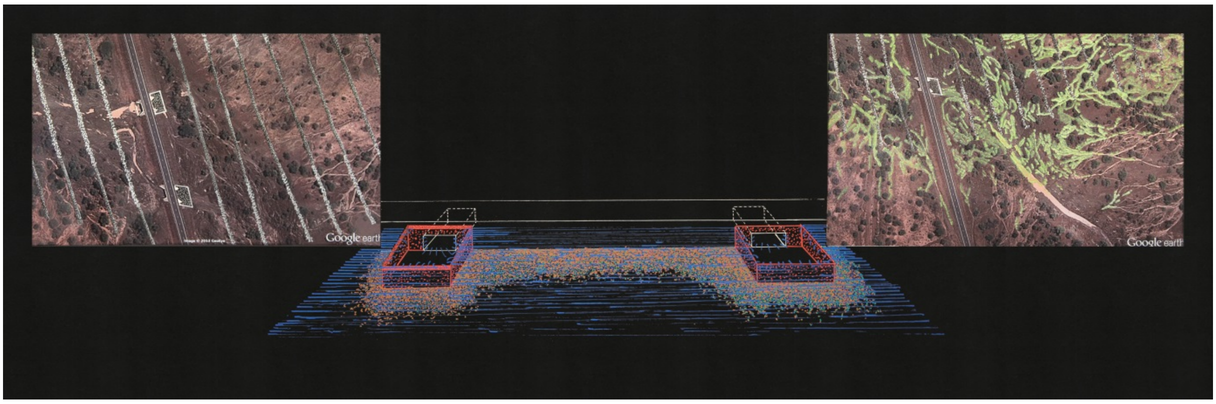
1,2,3 (1)The newly constructed Tarmac road connecting the Amboseli-Kilimanjaro region with the Mombasa-Nairobi-Kampala highway, (2) is threatened on more than ten locations with a potential wash out from erosion. The smooth concrete bridge constructions helped to provoke (3) accelerating runoff water velocity, far beyond the entry and discharge points in this previously fertile currently drying, dying land surface.

1 This runoff eroding shrub land, devoid of erosion combative grass cover, used to sustain large roaming cattle herds less than a decade ago.

2 Most of the cemented stone bridge protective intakes, sustain cracks and holes in the pre destiny of final wash out from increasingly violent flash flows, transporting the fertile soils via the Athi River to choke the Malindi coral coast and further maritime trajectory.

3 The evenly dilapidated discharge and intake regions both sustained teeming wildlife populations in recent history decimated by more frequently recurring drought spells, however not from a lack of water since Amboseli's swamps are in majority perennial, but from drought-drainage accelerated food productive deficiency.

Mberikani 3 b



1.Twin discharge contour trenches, excavated soil deposit at the centre of the twin trenches, slowing drainage from spatial splitted discharge into the main seasonal river draining in the Athi River. // Intake contour trenches; excavated soil deposited an compacted in trench interrupted erosion gullies, with left over loose deposit extending the trench capture capacity, discharging excess flood water smoothly against the road elevation from concrete box enhanced drainage into the existing concrete bridges.

1.The northerly bridge culvert is one meter lower situated than the southern one and will therefor need a concrete box elevation, one meter higher, to safeguard equal twin discharge into the ten meter wide bridge culverts, from twice that wide box elevations, an overcapacity built in to ever guarantee unhampered discharge, even if debris would in part obstruct an overall equal drainage. // The 150m long intake trenches have a capture capacity of 600 cubic meters per rain event with excess runoff water draining towards the 20m wide box elevations, to accumulate on the eastern side of the road reserve and finally focus in two ten meter wide drainage flows, scattered against the soil deposit of the twin 75 meter discharge trench system, terminating erosive potential from a 7.5 fold spatial drainage expansion.

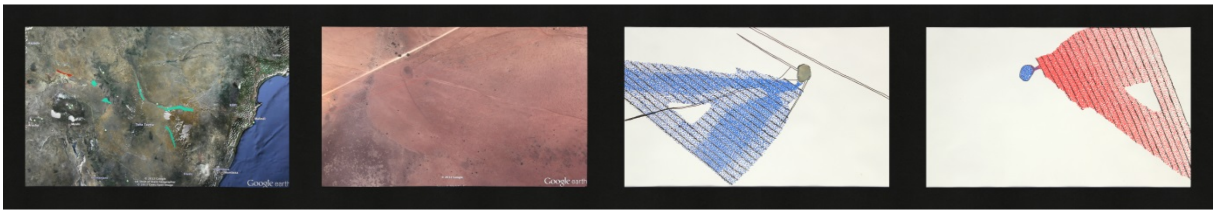
2. The road reserve physically bisects what beforehand was one cohesive aquatic constellation, bringing both intake and discharge in an interconnected however unmanageable acceleration, threatening to erode the shrub interspersed land surface into initially a dust bowl ending up in rock-sand plains, thermally enhancing regional temperature aggravating erosive drought and flood upheaval, annihilating the remaining wildlife, cattle and farming and for that sake any economic activities.

3. The thus reduced runoff water velocity, in multiplying water infiltration and subsurface accumulation thereof, automatically turns into an evergreen vegetation recuperation, further slowing regional drainage up to the top contours concerned, per rain event; in generation of dense forested grassland, reinstating economic utility with a direct infrastructural connectivity to east Africa's major urban conglomerates. More than a century of misguided development, destroying all benevolent natural physical interactions which accompany life in the world's equatorial hemisphere, including the current destructive and often lethal characteristics of what is supposed to be life generating rainfall, will consequently be reinstated to the point where each rain shower again propels growth and economic prosperity.

Risa 1 a

1,2,3,4 (1) Risa 1, with its surface water conducive, wing configurated ditches, seeks to focus runoff water of approximately one square kilometre (2) is a non-perennial surface water body and therefor economically speaking a non-viable deceitful entity. Runoff water from one square (3) kilometre under 400 millimetres annual rainfall consists of 400.000 cubic meter, which leaves 240.000 cubic meter of consumable water after 40 (4) percent deduction for seepage and evaporation, while the dam's holding capacity is a mere 3000 cubic meter, leaving an additional 237 (1) thousand cubic meters in a free and consequent erosive, atmospheric and terrestrial meandering flow into the Athi River, on its way (2) to join the large and warming oceanic water cycle, for the umptiest time, to return and unleash the accommodated energy upheaval in all (3) destructive torrential and merciless power. Should the dam be perennial, the holding capacity could cater for 380 head of cattle, however with its current non perennial (4) status, the dam is more of an additional atmosphere destabilising factor of 397 million litres, which could be considered as a drop in the ocean, one of......

Risa 1 b



1,2 .....(1)the many, relentlessly pounding the continents, all over the globe. All vapour flows returning to the world's larger surface water bodies, (2)such as lakes and oceans, in terrestrial capacity, are propellants for atmospheric climate warming, in ignition of rainstorm (1) destruction on land surface, accelerating runoff water velocities, which exponentially annihilates vegetation cover in drainage (2) trajectories, fuelling climate warming and vice versa. Energy accumulation from conspiring drainage trajectories, is not solely (1) determined by unilaterally directed drop velocity from elevation discrepancies, however, doubling, tripling and after all multiplying (2) runoff volumes, relatively decrease the impact of decelerating friction from cohesive riverbed conduit.

3 Riza Dam must be converted from a small non perennial surface water dam unable to accommodate the estimated 400.000 cubic meter annual runoff potential into a perennial one from a V focussed dam drainage directed contour trenched infiltration unit with a 27.000 cubic meter infiltration capacity per rain event. This is a volume 9 times the current dam's water retention capacity, in evaporation free evergreen filtering, precipitation attracting, subsurface storage, sustaining 400 head of resident cattle.

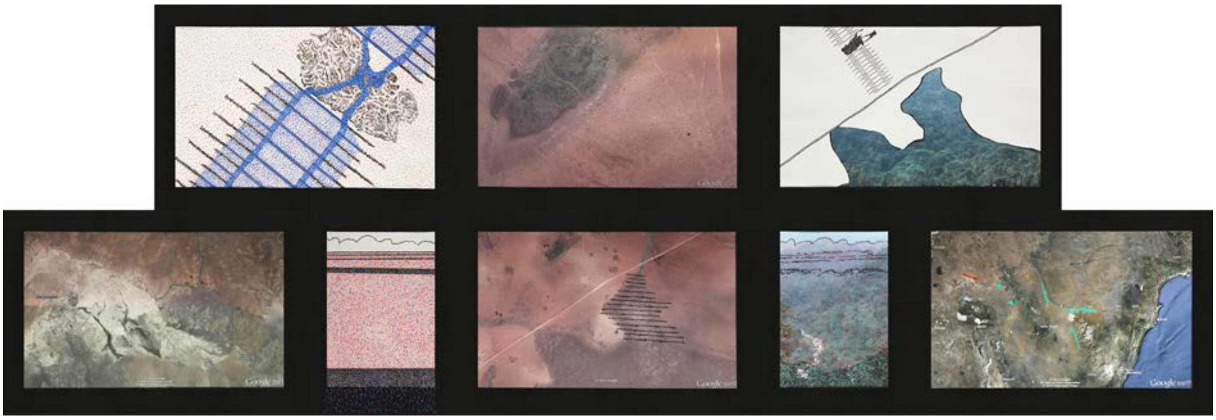
4 Subsurface water volumes held in custodian balance by interconnected surface water bodies release embedded energy in evaporation of the captured surface water and drainage of the accommodated subsurface volume in an underground and therefor evergreening trajectory, along in this specific case a thirteen kilometre long seasonal river, before reaching and amalgamating into a major regional runoff. The re-greening into perennial status of this seasonal river trajectory, decelerates direct rain seasonal runoff in subsequent enhancement.

3,4 (3) Hydrostatic pressure increase from aquatic spatial focus (4)in addition to drop velocity from elevation discrepancy for the re-servicing of consumable water.

Risa 2 a

1,2,3,4 (1) Contour trenched automated forestation: Risa 2, 500.000 square meters, 200 million litres of (2) rainwater reception, evergreen grass cover thereafter, four meter high Jatropha forestation, infiltrating 800 million litres of rainfall, attracting (3) indigenous forestation from each additional 200 million litres rainfall reception, triggering forest shaded temperature decrease of 20 degree Celsius thereof, (4) in generation of atmospheric rainwater accumulation propelling further rain forestation.

Risa 2 b



1 Solar energized denuded topsoil// Subsurface water infiltrated coolant// Subsurface water condensed flow// Hydrostatic pressurized surface water body

3 Contour trenched land surface depression// evergreen grassland upon first rain saturation// Jatropha forested grassland from four years rain saturation//indigenous forestation.

1,2,3,4 (1) Risa 2 is a natural bowl shaped land depression of approximately 500.000 square meters mostly denuded land surface in direct rain recipient (2) water volumes of 200.000 cubic meters from 400 millimetres annual rainfall, which leaves a consumable water volume of 120.000 cubic meters after 40 percent (3) reduction for evaporation and seepage. A daily consumable water production of 328.000 litres, re-greening 500.000 square meters (1) into evergreen forested grassland thereof, can sustain 600 head of grade A cattle in tri-annual circulation, not taking any hay consumption (2) into account, requiring 4.380 cubic meters of water per year, which leaves 115.620 cubic meters per year, or 316.000 litres per day, to cater (3) 300 litres to 1.055 people per day, including migratory and resident wildlife in the area. (4)of rainwater infiltration, extending evergreen erosion combative vegetation cover.

4. Some eight weeks after the rain have seized, the formerly shallow seasonal Lake Amboseli returns to its predominantly dry, saline and dusty plain state, leaving the eroded soils from the surrounding land elevations under debilitating daily solar radiation, disabling vegetation to take root on these in principle fertile soil influxes due to a lack of water and the long periods of inundation. The lakes regional bi-annual atmospheric over saturation affects the east African climate in circular Lake Victorian trajectory, adding to the erosion in Rwanda up to the volcanic range bordering with Eastern Congo, to circle and get trapped between Western Kenya's Mount Elgon and Cherangani Nandi Hills extension in frequent flood subjugation.

4.Contour trenched seasonal river intake and discharge;

R3 intake infiltration altitude 1.173m, R3 discharge infiltration altitude 1.155m, Distance R3 intake – discharge 6.500m

R1 intake infiltration altitude 1.198m, R1 discharge infiltration altitude 1.114m, Distance R1 intake discharge 13.000m

5,6,7,8 (5) Top contour trenching of all the river intake and discharge points, not only (6) into the seasonal Lake Amboseli, but also in river intake and discharge points in the opposite direction, such as the Risa intake and discharge in northerly direction, will (7) slow the runoff in all the treated rivers, adding subsurface discharge trajectories, (5) cutting erosion into vascular forest formation, in gross reduction of (6) the lake's surface water accumulation, permitting extending forest occupation to increase lake bottom infiltration. The sequence of bi-annual billion cubic meters (7) flood water infiltration, in conjunction with abundant daily (5) solar heat transfer into recuperating vegetation cover are the ultimate propellance for (6) extensive rain forest formation regulating regional rainfall up to an beyond the Kilimanjaro's montane forests, tempering current soaring daily temperatures (7) in simultaneous deceleration of the mountains hydrologic discharge, enhancing, icecap (8) rejuvenation into growth.

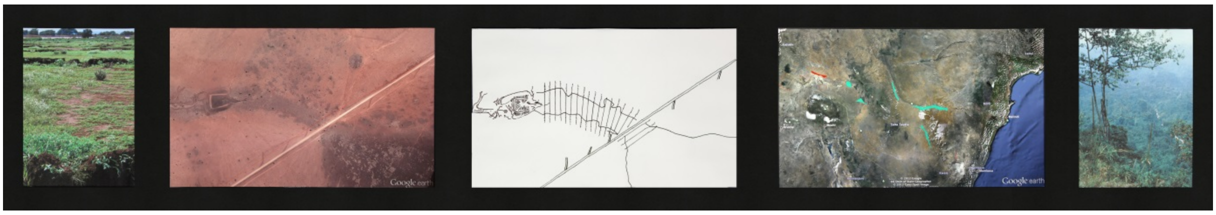
6. Scale 1mm = 12,65m; Intake infiltration capacity: 35 trenches x 126,5m length x 1m depth x 4m width = 17.710 m3 per flood event; Max altitude 1.198m

8. Project locations
3 Tsavo Triangle, 1 Sala-Tsavo, 2 Aruba-Bachuma (East)
5 Mberikani, 4 Rombo, (Center)
7 Olgulului, 6 Meshanani-Risa, 8 Kitenden (Amboseli-plateau)
9 Namanga, 10 Longido (West)

Risa 3 a

1,2,3,4,5 (1)Conversion of regional seasonal surface rivers into subsurface flows will make surface dams perennial (2) since the surface water volumes of those (3) dams only permit drainage of evaporation free subsurface water quantities in hydrostatic pressurised balance with the daily off take from evaporation (4) and consumption on condition that the sloping land surface and soil embedded (5) subsurface volume equals the vertical hydrostatic pressure from the deposited surface water body.

Risa 3 b

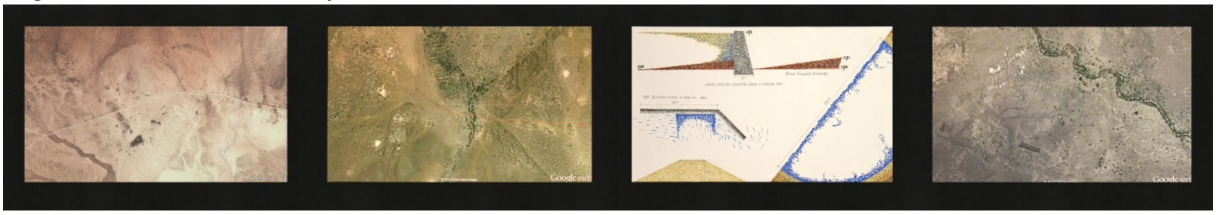


1,2,3,4,5 (1) Risa 3 has two potential discharge trajectories into the seasonal Lake (2) Amboseli depression; one consists in an east-south-west pattern, the other one bypassing the existing dam from the east-northeast and west (3) into Lake Amboseli, both in a similar elevation profile from 1.194 meters down to 1.135 at the lake bottom. Both drainage trajectories must obtain a contour (4) trenched infiltration unit at the higher contours regulating intake and at the lower contours decelerating discharge, to permit automated forestation (5) to take root in both channels from prolonged aquatic (1) custody, further slowing erosion free discharge from intensifying (2) vegetation cover, interconnecting both subsurface stored and bi-annual accumulating water volumes.

Bamboo **AMBOSELI**

Amboseli is a seasonal lake north-east of Kilimanjaro. Kitenden and Meshanani are the first two infiltration units built by Peter Westerveld in 2010 and 2012 respectively. In addition he had infiltration projects in Tanzania (Hanyara), Mali and Vietnam. The Olgulului floodplain drains too fast to Amboseli lake by lack of vegetation. Calculations has been made for groundworks, for green cover to stabilize climate extremes and an evaporation free underground water storage for cattle.

Olgulului 1a Kitenden, Hanyara



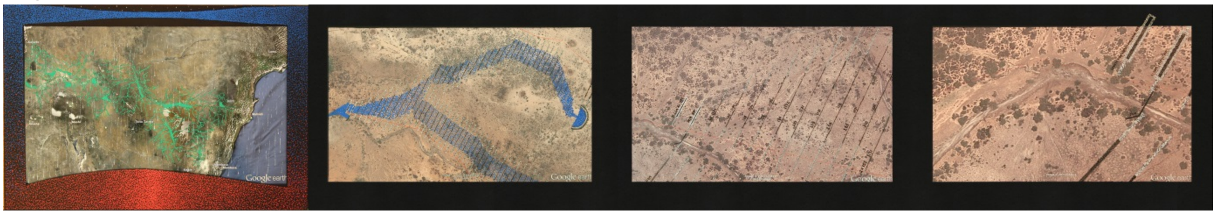
1 Meshanani, Amboseli, Kenya, runoff water infiltration unit 2012

2 Kitenden, Amboseli, Kenya, rain/river infiltration unit 2010

3 River deposited sand-water mixture // Cross section earth surface water dam, earth movement 75m3/m, Top section surface water dam, circumference 250m, earth movement per dam 18.750 m3 // Surface half circle (π x 80 x 80)/2 = 10.050 m2, Water volume at 3m depth = 30.150 m3

4 Manyara, Tanzania, runoff/river water infiltration unit, to be completed

Olgulului 1 b



2 Daily solar radiation turns evapotranspiration into altitude and night cooling atmospheric contraction, triggering regular regional rainfall. // Bisecting surface and subsurface river water flows for evergreen vegetation and perennial consumable water production.

3 Contour trenched river water intake for further subsurface inland distribution.// Contour trench generated organic filter tempering flood water velocity into an overland sheet flow.

4 Cyclobe concrete enforced intake trench, slowing river water velocity.

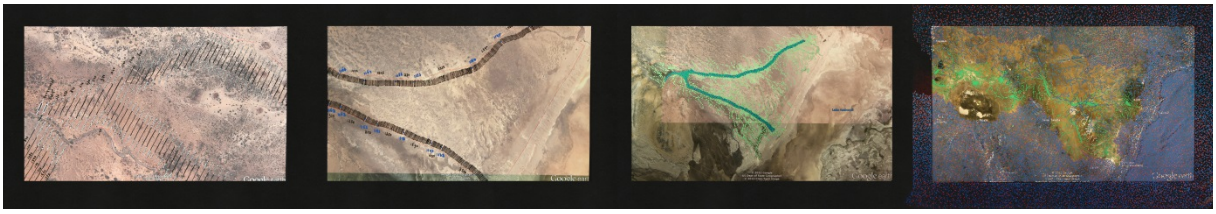
Olgulului 2 a

1 The Olgulului flood plains near Namanga, Kjiado subjected to vegetative degeneration due to diminishing water infiltration, accelerate discharge into the seasonal Lake Amboseli, enhancing evaporation and subsequent regional flood risk.

2,3,4 (2) Deforestation of the Olgulului River catchment accelerates the previously benevolent flood waters into a torrential river, (3) seasonally eroding the river bed into an ever increasing depth, unable to replenish the thirsty plains; with single discharge (4) into the seasonal and land locked Lake Amboseli, to end in uncontrolled evaporation, in disturbance beyond the regional climate.

3. Projected location concrete wall dispersal dam.

Olgulului 2 b



1 Earth movement required for east and west intake trenches is 8.220 m3; Subdividing trench capacity for east boundary is 32 trenches x 640 = 20.480 m3; Dividing capacity to cater for the west boundary is 31 trenches x 640 = 19.840 m3; Total subdividing trench capacity for east and west boundary is 47.940 km3; Grand total earth movement required for Olgulului east and west boundary 685.000 m3.

2 Distance from dam 1168 to 1140 is 12.780 meters; Trench interspacing, trench inclusive is 44 m; 12.780 : 44 = 290 trenches times 640 m3 per trench is 185.600 m3 earth movement; Earth movement per dam is 18.750 m3; 8 x 18.750 = 150.000 m3; Total earth movement required for the east boundary is 335.600 m3

2 Distance from dam 1168 to 1135 is 10.225 m; 10.225 : 44 = 225 trenches times 640 m3 is 150.400 m3; Earth movement for eight dams is 150.000 m3; Total earth movement required for the west boundary is 300.400 m3

Grand total earth movement for east and west boundary is 636.000 m3

3 636.000 m3 of water infiltration per flood event creates a gently moving subsurface water wall fuelling an evergreen vegetative curtain in subsequent up an downstream, formerly eroded pattern, generated by backwashing and drainage respectively.

3 Vegetation is the manager of both the small water cycle as the large one, as it dictates evapotranspiration. Trees create their own microclimate, turning large territories into moderate regional climate, thus reducing climate warming of the large water cycle and consequent upheaval thereof.

Inikiito Dam 1a

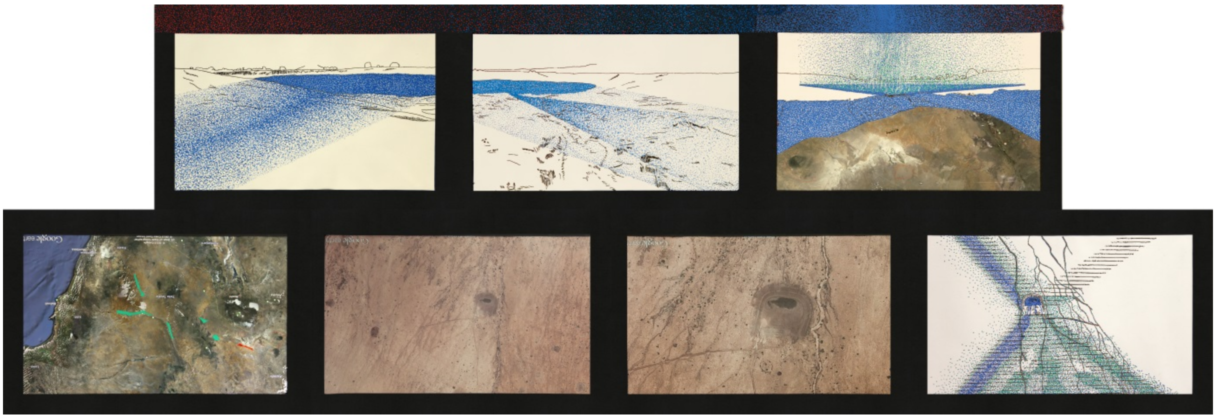
Inikiito Dam under erosion and siltation

1,2,3 (1) After 40% (2) reduction for evaporation and seepage, the dam furnishes 18.840 m3 per year, sufficient to cater 20 litres of water per day to (3) 2.580 head of cattle.

7,6,5,4 (7) Contour trenching of the Inikiito runoff area with 70.200 m3 earth movement, leaves a congruent cool and evaporation free (6) subsurface water collection capacity per flood event or 3.7 times the surface dam capacity. The initial evergreening of Inikiito's intake (5) and drainage area in simultaneous provision of drought resistant perennial potable surface water, both with a 3.5 year warranty, form the solid (4) basis for cattle breeding and the survival of resident wildlife.

4,5,6,7 (4) Contour trenching of the Inikiito runoff area with 70.200 m3 earth movement, leaves a congruent cool and evaporation free (5) subsurface water collection capacity per flood event or 3.7 times the surface dam capacity. The initial evergreening of Inikiito's intake (6) and drainage area in simultaneous provision of drought resistant perennial potable surface water, both with a 3.5 year warranty, form the solid (7) basis for cattle breeding and the survival of resident wildlife.

Inikiito dam 1b



1 Denuded landmass ignited atmosphere warming.// Descending subsurface water flows seek surface equilibrium upon encountering underground obstruction.

2 Forested atmospheric temperature absorption // Descending subsurface water flows focussed in spatial reduction, seek surface liberation for accumulative hydrostatic pressure.

3 Evapotranspirational cooling and atmosphere saturation triggers rainfall from the combined large oceanic water cycle and local evaporation.// Subsurface water flow velocity in status quo with aquatic dynamics of non motive surface water translates in evergreen regulated evaporation and rainfall.// Subsurface water flow propelled evergreen vegetation

4 Contour trenched evergreen forest saturated infiltration unit.// Riza Meshanani under construction// Location awaiting contour trench excavation

7 Diagram: (sub)surface waterflow // Backwashing vegetative expansion // Erosion gully transmitted vegetation growth from water velocity reduced intake and discharge // Soil deposit contour trench.

Distance dam (1150m) to road reserve (1133m) = 930m, Altitude decrease = 17m// Distance dam (1150m) to top contour (1180m) = 1350m, Altitude increase = 30m

Subsurface storage capacity eastern drainage: 32 trenches x 600 m3 = 19.200 m3 per flood event ; Subsurface storage capacity western drainage: 48 trenches x 600 m3 = 28.800 m3 per flood event; Total required earth movement: 48.000 m3

Subsurface intake capacity eastern boundary: 40 trenches x 600 m3 = 24.000 m3; Subsurface intake capacity filter trenches: 15.000 m3; Subsurface intake capacity western boundary: 48 trenches x 600 m3 = 28.800 m3; Total subsurface storage intake capacity 70.200 m3

Inikiito Dam, R = 100m, surface = 15.700 m2, water depth = 2m, surface storage = 31.400 m3