

Water management

For road infrastructure to become truly multi-purpose three things have to happen:

- There is a need for close institutional cooperation between those responsible for road development, watershed management and agriculture;
- In addition it's important to include water harvesting in roads planning. The current road planning rarely allows the incorporation of broader multiple-function objectives, local perspectives or attention to poverty. However these processes can be modified to bridge this gap between road, water and agriculture sectors;
- Finally, local communities need to be involved in the design so as to indicate local water needs and alert different authorities and road designers on the opportunities and constraints for water capture along the roads. This will require a different style of working by roads engineers, but it will go a long way in reducing the water damage to roads, now the single largest cost item in road repairs.

Benefits of harvesting road runoff:

- Moisture levels in soils will increase;
- Shallow groundwater levels will increase;
- Gully expansion will be stopped;
- Reduction in flooding of dwelling houses and farmlands;
- There will be less damage to roads.

to get help from experts like MetaMeta to do it properly," she says.

MetaMeta promotes water conservation, including the use of runoff from roads. It leads The Roads for Water Consortium, which aims that by 2025, in at least half of the countries in Africa and 25 per cent in Asia, 50 per cent of all roads will be water buffered. The organisation works with roads authorities, agricultural and water bureaus to promote road water harvesting.

According to Ms Bosma, the organisation started the 'Roads for Water' project a few years ago in Ethiopia, and they quickly adopted the innovation.

More and more people are now practising water harvesting from roads. The Ethiopian Government has put a lot of effort into this initiative by providing much-needed infrastructure and also helping farmers to dig and construct trenches.

And in Kenya, this low-cost initiative is already gaining popularity among farmers in Kitui County. "If properly practised," Ms Bosma says. "This innovation can transform arid and semi-arid areas into green fertile arable lands."

hospital bills.

The ex-police officer's farm is full of surprises. He successfully grows his trees with minimal water from plastic bottles and his make-shift fly traps that hang from mango trees are very effective.

Mr Ndolo started by building five terraces on his land because it is steep. He then dug a shallow trench from the roadsides just outside his house, to trap and direct the water to his farm when it rains. Across the farm are deep trenches and channels where the water collects. In some of the trenches he has planted bananas, which are doing very well. Each trench has a specific role in water circulation and controlling runoff throughout the farm when it rains and by the time the last trench is getting full the rainy season is almost over.

Ms Bosma explains the different ways to harvest water from the road. You can divert water from culverts, channel mitre-drains (an open drain that diverts run-off from a shallow drain set into a road) into farmlands, from deep trenches, develop small water bars to take water from the road surface, use road river crossings (so-called drifts) for water retention or reuse borrow/quarry pits as reservoirs. There is a need for ponds, reservoirs, diversions/cut-offs, trenches, soak pits and terraces.

"All these methods are very effective, although you need proper guidance and advice to start harvesting water from the road," she says. "Runoff water can be dangerous, especially during heavy rains. It could destroy your whole farm in one night. This is why it is important

His neighbours are yet to cotton onto the practice and the difference between his land and theirs is astounding.

We are joined by Mr Mike Nzuki and Ms Luwieke Bosma from Meta-Meta, a research and consultancy firm that is helping governments to develop new, innovative protocols and mechanisms to enhance water conservation. Our curiosity is drawn to Mr Ndolo and we wonder how in a place where rain is seldom regular or adequate, this man in his mid-60s has managed to turn his farm into a small, green self-sustaining ecosystem.

We learn from Ms Bosma that it is simply from harvesting road runoff water. She says that roads can be a very effective way of harvesting and holding rain water.

"There is so much water that goes to waste on the roads when it rains. If only we could harvest or channel this into our farms it would go a long way in improving water levels in the soil," she adds.

When we visited, his land was tilled and ready for planting. He plants cassava, pigeon peas, maize, cow peas, mangoes, avocados, bananas and dolichos bean (njahi). From the income he is able to sustain his family quite comfortably.

"I always supplemented my salary with my earnings from the farm and that is how I managed to educate all my nine children," says Mr Ndolo.

When he retired in 2002 he invested his terminal dues in the farm and planned to build a dam. But as fate would have it, he was involved in a terrible car accident and was admitted to hospital for two months and used the money to clear his

Mr Edward Ndolo's farm in Kitui. He harvests road runoff to irrigate his farm. Bottom: Techniques being used by other farmers to collect runoff from roads. PHOTOS|IAN KIPLIMO/COURTESY



Flooded roads breathe life into farms

How you can use roads to water or irrigate your farm

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In these times of drought and climate change, with water scarcity becoming prevalent, it is imperative that we harvest and save whatever little water we can find. There are various ways of going about it. However, one very interesting innovation that has received little attention is road water harvesting.

Yes, you can harvest the water that runs off the road on to its sides before disappearing somewhere. Sometimes it forms puddles, or deep gulleys or flows into your shamba, wreaking havoc on your crops. You can stop the damage and turn this destructive force to your own good, especially if you live in a semi-arid area where lack of rain causes a lot of pain.

There are farmers already using this method and reaping the benefits of a free alternative water source and this is also making them more resilient to climate change impact and water scarcity.

Harvesting runoff water from roads harnesses what would otherwise go to waste. It also leads to higher water availability, increased production, the safeguarding of roads and landscapes and improvement of the livelihoods of the communities bordering roads; while recharging the ground water levels.

Roads often cause floods and water logging, while the runoff from culverts causes erosion and sedimentation. However, these

same roads present a great potential that can be harnessed for the development of reservoirs for increased resilience.

Smart Farmer set out to discover more about this from farmers already tapping into this unusual resource.

Kitui Central, Mutuni Location, Kaveta Village

The sun blazed up in the sky as we drove to Kitui County. It was a very hot and dry day, especially at this time of the year.

Kilometre upon kilometre, we travelled across the semi-arid landscape, until we arrived at our destination, which turned out to be a huge surprise. Etched out of a dry and unforgiving environment, the greenery and the cool breeze that ushered us into the farm was amazing.

The Smart Farmer team had come all the way from Nairobi, driving almost 190km, to see Mr Edward Kiema Ndolo, a retired police officer, who is defying all odds by harvesting from the road to turn his farm into a green haven.

Immediately we stepped out of the car, we could feel the change in environment from hot and dry to a cool breeze that gently caressed the face.

Mr Ndolo has been using road run-off for the last 20 years and this has seen his yields double. All around this farm are huge trees with rustling leaves that completely engulf it, giving it that look of an oasis. There are many types of fruit trees and crops on this

three-and-a-half acre piece of land that is also graced by a tall healthy coconut tree in the middle. And even more impressive is the moistness of the soil underfoot. It is a rich soil, full of biomass that holds promise of a rich harvest.

