ICWA
LETTERS

Institute of Current World Affairs
The Crane-Rogers Foundation
Four West Wheelock Street
Hanover, New Hampshire 03755 U.S.A.

JGW-15
SOUTHERN AFRICA

James Workman is a Donors' Fellow of the Institute studying the use, misuse, accretion and depletion of fresh-water supplies in southern Africa.

To Drink a Mirage

The Foggiest Idea: Elusive Extraction of Water from Wind

James G. Workman

MAY, 2003

SOUTH OF THE KUISEB RIVER, Namibia–I awoke just after dawn and noticed tracks through sand leading straight into the desert. There were countless smaller indentations left over from the mating and feeding frenzy during the night: beetles, white lady spiders, scorpions, geckos, birds and sidewinder adders all cris-crossed each other in zig-zag nocturnal pursuits. But right through the middle of these ran the unmistakable large prints of a solitary black-backed jackal. The outline of the paw print was fresh, sharp and distinct. And the stride-spaces and depth and direction indicated it was moving at an unhurried trot on a course that led unswervingly into the heart of the central Namib.

I looked up. Its sensuous ochre dunes loomed up in a wall of waves, and for silent minutes I watched the rising sun and wind initiate a mesmerizing interplay of shadow and light, wondering what the jackal was seeking out there in that vast sand sea. Then I could no longer sit still. I had to follow.

The 80-million-year-old desert appeared in no rush, but this 34-year-old was. I realized that for the first and perhaps only time, I had the whole undulating horizon to explore all by myself. I hurriedly dressed, pulled on a cap and grabbed my camera, hoping to capture the desert's fluid arcs and contours before the bright midday sun bleached it all flat. The air smelled cool from the night and so, with characteristic pre-breakfast logic, it did not cross my mind to pack water.

Kalahari: forgot tools. Sahara: forgot food. Namib: forgot water. Africa's deserts seem to bring out the stupid in me.

Still it's hard to think clearly while being seduced by voluptuous shifting curves like these. Caution flees the mind. Even with some vague premonition of consequences for reckless behavior, you play down pain to come. While loading film and stripping sandals you promise your conscience: *Won't go far... just this once…. can stop anytime.*

Turn back, nitwit, your conscience answers. Namibia was the most arid nation south of the Sahara and the central Namib was the driest, hottest pocket of the country. It rains 0-25 millimeters a year; 3,700 millimeters evaporate. I once had seen clouds release drops that vanished a mile above the ground. Banana peels do not decompose; they shrivel brown and harden for decades. Gee, I thought. That could be me. Water made up 70 percent of my body's tissues, just waiting to desiccate. My flesh could spare losing up to 5 percent — roughly a six-pack — of water before severe dehydration reached my thick skull and impaired the brain's already dubious ability to process information. Indoors, my organs took a full day and night to breathe, sweat and urinate that precious amount. Walking in a

The Voluptuous Namib, with Naukluft Mountains Behind: *A seductive landscape 'where we strut and fret our lonely (and thirsty) hours upon life's stage.'*

desert, following jackal tracks, the process might take two hours.

* * *

Were I the only wretched creature seeking to experience the central Namib without a reliable supply of water, my situation would be merely foolish and pathetic. But I wasn't alone. Thousands of weird species — including tens of thousands of humans — lived and commuted and foraged in this harsh part of the desert, all testing the limits of Darwin's hypothesis. As revealed by the night-tracks, the place *teemed* with life. If jackal could adapt here, I reasoned, so might this less clever mammal. I recalled time-tested travel advice: Don't panic. Imitate the natives. When in Rome, do as the Romans do.

Alas, the few human 'Romans' I'd found here were themselves in an equally sticky bind. "They diverted our river's proper flooding to protect their city; they dammed its upstream tributaries to hold back water to feed their highland commercial farms; they lowered the water table to process their uranium mine," explained Rudolf Dauseb, local leader of the scattered remnant of a tribe whose people were being sucked dry from all sides. "I worry for our future."

'River' was a loose description of the Kuiseb, a dry bed that floods for days or hours only once a year, with luck. 'They' were Europeans who arrived five centuries ago equipped with water-harnessing technology. 'Our' meant the Nama-speaking Topnaars, descendants of Namibia's second oldest population group after the Bushmen. When the Europeans washed ashore, the Nama's nomadic ancestors, called "strandlopers" or Khoi-khoi or "Hottentots," had been herding small livestock, and farming on the edge of the Namib.

'Farming' is as rough a definition here as 'river.' The Topnaars cultivated 81 species of indigenous wild local plants for food, trade, medicine, cosmetics and fuel. Their staple "cash crop" was the thorny-stemmed !nara melon (the ! means click, for click-language speakers), grown in fields carefully passed down through individual lineages. The !nara was and is arguably Southern Africa's first and oldest form of private property, and trade good. Despite its harsh sounding Latin name — *Aconthosicyos horridus*

Wet Nurse? *This thorny but essential melon is said to be the foster mother that breast-feeds the Topnaar children.*

— the !nara is to Africa's Topnaars what the buffalo was to America's Sioux. Melon seeds are roasted and sold, pulp eaten, roots used for medicine, oil as a cosmetic, and peels fed to goats, cows, donkeys, chickens.

Scoffing at rainless years the !nara draws moisture up from 30-50 meters underground, which sets an example for all people to follow: in the search for water, don't look up; look down. And so they did, living, farming, herding and drinking all along the lower reaches of the central Namib's few ephemeral rivers.

Dauseb worried that the political devolution of water authority would leave the Topnaars both politically and hydrologically high and dry. (See box below) Before the hand-over was complete he was battling to replace the unreliable pumps and get extension hook-ups to the water infrastructure. But even that would only help people drink, which was, it seemed, only of secondary concern. "Now even our !nara fields are declining, dy-

Home, Sweet Home: Dead camelthorn acacia in Deadvlei. *In the battle between sand and water and wind, some plants and animals are sacrificed. If the Topnaar can't live in the hostile Namib, or teach others how to live here, a survival skill — arid land adaptability — would be lost to Namibia and, by extension, to the world.*

A 'LIFELINE' RUNNING DRY

To appreciate how precari ous the local water balance here is, you need to understand the physical and political dynamics of these 'rivers.'

"You just missed it," said a local when I first arrived on the banks of the Kuiseb.

"But I just saw it moving this direction two hours ago."

"Where?"

"Up in Naukluft Canyon."

"That was there in the highlands, not here. Here it's come and gone several days ago. And there's not another one expected for the year."

We spoke as if I had missed a rare and expensive locomotive — which captures the kinetic essence of the noisy crawling liquid beast that plows sticks, mud and debris ahead of it then pulls a caboose behind it, vanishing with nothing to show but the hardened sinuous 'tracks' of its journey. Upstream, ephemeral rivers may be wet and

Linear oasis, or lifeline of the desert. *These sinuous 'tracks' left behind from the brief flow of the Kuiseb are a hardcaked clay that seals in water beneath the surface to recharge the primary alluvial aquifer below.*

fluid. But here, downstream, even the floods rarely reach the sea before sinking down to recharge the primary alluvial aquifer — the cracks between rocks and sand, trapped above clay lining in the river floodplain.

That hydro-dynamic shapes 12 'linear green oases' or 'desert lifelines' of the Namib, especially for the Topnaar. In the past they got their paltry supplies of water from the plants, from traditional hand-dug wells 5-15 meters deep, and much later from boreholes pumped by diesel engines and windmill, which broke down frequently.

Beset by high costs in skilled labor, equipment and maintenance, the government's office of Rural Water Supply (RSW) has begun to 'hand over' control, operation and maintenance of its rural boreholes to RWS local communities all across the country. It's not always clear if this is driven from above or below, but by 2007 it hopes to form and train several thousand 'Water Point Committees' to be independent and self-regulatory, standing on their own.[1]

[1] At the current rate of progress, it will fall well short, to only register 20 percent of its goal. The effort appears a worthy but messy and clumsy process, akin to the devolution described in *Nilometer* (JGW-12). I'll try to describe southern Africa's attempts in depth in a later dispatch.

ing, in some cases gone. If it continues like this the harvest might soon be history."

So what? you might ask. The government pointed out that these cultivated desert melons were no longer a commercially valuable crop. But value is always relative. "We refer to the !nara as our foster mother, the wet nurse who breast-feeds the Topnaar children," said Dauseb. "No water, no !nara. No !nara, no Topnaar. We would simply scatter, melt into the thousands of other Nama."

That forced end of !nara-based livelihood — and thus identity, tradition, culture, and pride — would be troubling for practical as well as spiritual reasons. It would compound ethnic tensions of unemployed rural dwellers crowding Africa's cities without skills. It would erase the only 'Romans' who really know, and could still teach, how humans can live in the Namib. That skill will prove useful to all. For despite limited water, the industrial growth and real estate values in Luderitz, Walvis Bay and Swakopmund kept skyrocketing smack dab in the middle of the desert.

These cities blithely existed because they sucked water from beneath those 'linear oases,' the ephemeral river aquifers of the Swakop, Kuiseb and Omaruru. But in recent years that groundwater began to taste brackish, with an unhealthy quantity of dissolved salts. Luderitz already had been 'mining' water that would never recharge; now the bigger coastal cities were, too. Due to downstream extraction and rising aridity, the Kuiseb aquifer is predicted to run dry in 17 years.

Surviving that water-reckoning involves more than conserving use; humans have to find a new source of supply. "Finding that is not just the Topnaar's problem," said Paul Sheller, manager of a Namibian government desert research and training station at Gobabeb. "The Topnaar can adapt, or move. They'll make a plan. But what the hell can these cities do?"

* * *

My nostrils felt dry, my lips chapped. I'd underestimated distances. The clear morning air made the sharp edges of the dunes appear closer than in fact they were. With heat rising, loose sand slowed my steps. Trying to hurry to get within camera-focus range, I soon was out of breath and still only approaching the base of the dune.

While it might be comforting to know that thousands shared my predicament, it didn't slake my thirst one whit. For me, the reckoning was a matter of minutes and hours; for others, months and years. To stick around we would all be forced to explore alternative "appropriate technology," which is a trendy but vague development phrase. Some Namibians on the coast envisioned "appropriately" hooking up pipes to the Congo River, 1,700 miles to the north; others conceived of "appropriately" towing ice-

bergs here from Antarctica. Eventually, even "appropriate" desalination plants, which once seemed so logical, suddenly seemed "inappropriate" when people saw the obscene price tag attached. Unable to bring distant water cheaply to us, we had to make water appear out of thin air in the home we inhabited. That water-extractive effort was possible, even potentially lucrative, but only if it was put through rigorous ecological and economic wringers, that is, the logic and measure of this arid Namib desert 'home.'

I looked up: no rains. I looked down: no shallow groundwater. North: empty barren gravel plains. South: the dune sea. East: the river had come and gone. I scoured the western slip face of the sand dunes for clues of where to start a search.

Sand Sea Slip-face: *The dunes of the Namib are among the highest and reddest in the world. Three quarters of all life here eats, drinks and sleeps on the slopes of the dunes.*

One clue was the unique color of the sands beneath my feet. The Namib Desert extends 150 kilometers inland along Namibia's coast and stretches 2000 kilometers north from the mouth of the Olifants River (JGW-13) in South Africa to San Nicolau in Angola. The area I was stumbling into was quaintly known as the Lange Wand or "Wall of Death" and included the great Sand Sea. Over the previous 10 million years, the sands I was climbing originally eroded from what is now Lesotho (JGW-10, 11), washed down the Orange River (JGW-14), and were carried north by cold Benguela currents of the Atlantic Ocean onto the shore, where onshore winds swept them northwest into these dunes. Here's the color cue: the sand at the beach on the Skeleton Coast was pale; here, 60 kilometers inland it had turned a rich red hue. Why? Apparently the iron in the quartzite crystals of sand had oxidized, or rusted, from millennia of decomposition through moisture, a moisture that rolled in from the Benguela Current's atmosphere. Hmmm.

I climbed the crest of the dune, feet sinking deep into sand. The dune's surface was already hot on the east side, cool on the west. There, fanning out widely, was large, tall, spiky-tipped Bushman grass, *Stipagrostis sabulicola*. Unlike the deep vertical taproots of riparian plants, this

Natural Fog Screen: *The fan-like, spiky, shallow-rooted Bushman grass inspired another form of fog-collection.*

grass sends its roots radiating outward, horizontal on a shallow surface of the sand to collect moisture from…where?

Perhaps one of these 240 species of tenebronid beetles would tell me. For days I watched the "tok-tokkies" by the hundreds scurrying all over camp, pouncing on any food bits that fell off my table. These critters scour sand and rock for dead plants or insects. They tuck in between my toes, drawn by the moisture of sweat trapped there. Failing that, the beetles race from shade to shade wherever they can find it. I watched some dive deep into cooler sand below the surface. One strode with long legs extended to keep distance between its body and the scalding sand. Another ball-rolled itself downhill to escape predators. .

Photo courtesy Desert Research Foundation of Namibia

If you're thirsty and you know it, stand on your head. *This diminutive supermodel revolutionized both the concept and hydrophobic technology of human-designed fog-collection devices.*

Then one particular beetle literally did handsprings for recognition, and imitation. I had heard of it only in passing. On a cool morning between midnight and dawn, the Topnaars described to a researcher some strange behavior in what science would label *Onymacris unguicularis*. The beetle had emerged from the sand and laboriously climbed the slip face to the top of a western-facing dune, whereupon it proceeded to stand on its head. Why? The researcher got out her magnifying glass for a closer look. As it stood there, painstakingly balancing at the crest, she noticed that moisture from the air began to collect on its legs, then on its back. Tiny droplets formed. They rolled down small edge channels, which had no doubt evolved for just such a purpose, and fed straight to its mouth. Thus quenched, soaking up an additional 40 percent of its original body weight in moisture, it could go about its business for days.

Eureka! Life here didn't need rain, or groundwater. It could survive by looking to the West, seeking an ignored but far more abundant and reliable source of water that flowed upstream from the sea. Fog.

From that point on, the researchers began to focus on all the dew- and fog-water adaptations around them, constructing a 'fog web' like a 'food web' that linked not just the lichens and grasses and tamarisk and eggs and larvae and ants and scorpions and beetles, but those that feed on them. Nutrients were passed along, but so was moisture. I watched a dune lizard race by, and later came across the telltale signs of a sidewinder adder. Both reptiles lick the fog off their bodies, and also eat smaller things that absorb fog.

I tried standing on my head. I fell down repeatedly. I licked my skin. It was salty from the invisible evaporation of what was no doubt the loss of Can Three of my bodily tissue's six-pack reservoir. There was a fine line between scientific experimentation and brain dysfunction. In any case I soon came across another unusual form of fog adaptation that opened further possibilities for human imitation. Again, it was a beetle, a saucer-shaped group in the genus *Pelidochora*. This one constructs narrow trenches on the sand surface, perpendicular to the direction of the fog-bearing wind. The ridges of the trenches trap and concentrate more fog water than the surrounding sand. The beetle then retraces its steps, sucking water from the sand ridges. This animal 'harvests' fog from the sky in the same way grasses do, getting drops to collect and fall where they can be used with the least energy and most efficiency.

Tracks into emptiness: *The prints of jackal and hundreds of other species show they can survive here. It was dubious whether humans could, or for that matter, should.*

At that point I stopped. The desert was terrifyingly beautiful, utterly silent but for the wind. I could see why deserts throughout time attracted prophets and visionaries, not to mention misanthropes, crackpots and criminals. One feels a strange simultaneous mix of omnipotence and helplessness, comfort and restlessness. The jackal tracks led deeper toward nothing, but I could not follow

Fog Hazard or Fog Helpful? *A Swakopmund jetty vanishes into thick fog, while drivers in Walvis Bay curse the fog that blurs windshields and slows traffic, even as they curse the rising price of scarce water once they reach home.*

without succumbing to further, uh, dain bramage.

I tried and failed to whistle, or spit. Too dry. In defeat, I reluctantly pointed my feet toward the research station, wondering whether my fellow human species could out fog-harvest these other 'lowlife' desert species. Might we become part of the fog-web, and evolve over relatively few years what such 'simpler' Namib inhabitants took millennia to perfect?

* * *

"Humans definitely have the will, and the capacity," claimed Elias "Charlie" Shanyengana, a researcher at the Desert Research Foundation of Namibia's station at Gobabeb. "It's so self-evident. Fog collection had to start as a small-scale prospect, but it doesn't have to stay there. If we could get it right, it could be an option not just for rural people but coastal cities as well."

By the mid-1990s, Gobabeb's desert researchers like Shanyengana had amassed long-term records logging decades of weather data. It seemed to need only a nudge. In 1998 its scientists and the Topnaar collaborated on a pilot project to test potential large-scale viability. They started from the recognition that there was fog everywhere, and lots of it. "Fog events" slowed traffic along the coast to a crawl. I recalled ruefully how, weeks earlier, it took me an hour to drive 30 kilometers, wiping precious water off my windshield the entire distance as if fog water was unlimited. In fact, it was. Researchers documented fog enough for the decentralized, huge, diverse biomass of beetles, fog enough for lower and higher life forms.

The tricky part was capturing it. Parallel small-scale experiments had sprouted in other parts of the world — namely Chile, Peru, Ecuador and Israel — where coastal currents carry fog smack into arid but steep mountain cliffs. By contrast, the Benguela Current sweeps ashore here and encounters a whole lot of nothing. The geology of the Namib is flat, featureless gravel plains that rarely rise a meter per kilometer; dunes like the ones that lured me from the shade would pose ideal cliffs, but are too shifty and unstable to set up any permanent collection system. Complicating matters is the wind — too little from the foggy side, then suddenly too much from the dry. Unpredictable windstorms sweep in from the east to literally sandblast anything in their way, flattening delicate fog collection projects. Screens tear. Pipes clog with sediment. Rods bend.

Which brings us back to the main obstacle: man had

Past and future symbols of water supply in the desert: *In the background is a giant water tower, landmark of the Gobabeb Desert Research and Training Centre, that captures water from a declining aquifer that will be used up in 2020. In the foreground is a tool that has the potential to capture an endless supply of water from the air.*

conquered space but not yet evolved a 'fog collection tool.' But more recently — as drought was becoming the norm rather than the exception — the need for water had fired the imagination of would-be, garage-workbench inventors worldwide. One passive approach was absorption in shredded-paper bricks that sponge up moisture in the air and fog at night then release it by evaporation into a condensation chamber when the sun heats the bricks by day. An active tool was a cooling system and extractor — a fan-based prototype. A third used metals like a reverse radiator that could withstand the wind and sandstorms of the Namib. A Spaniard holds the patent for a $200,000 machine he claims can suck 250 to 5,000 liters a day out of thin air.

Of course, given endless funds and cheap energy, anything is possible. Without them, the range of options narrowed. Neither Gobabeb scientists nor the Topnaar people were uncompromising traditionalists, opposing new gadgets. Dauseb had lobbied for solar-powered borehole pumps. But pinched finances and low skills dictated realism, and the Topnaars are skeptics. Dauseb had seen proposals for massive desalination plants generate paper and foreign consultancies, but not a single drop of water. What's more, he did not like the idea of handouts, especially those that cannot be easily maintained.

"In a way, fog-water technology is not very new," he said. "The Topnaar used to carry leather cloth with them into the desert, and would suck or squeeze it dry in the morning; enough to last for the journey. We always watched the wildlife — like those beetles — and learned from it. We need to grow along with the technology."

The researchers and Topnaar community narrowed the pilot down to a simple, affordable, passive, and above-all *locally* inspired device. It combined the most effective of the three most visible Namib plant-and-animal fog-collecting technologies — the wide, thin grass screen to block the air and fog flow; the deep, beetle-like trench to gather and collect moisture; and the hydrophobic qualities of the head-standing beetle's back to repel and trickle water down rather than absorb droplets. The result: a 1-square-meter screen of polypropylene porous mesh — like the mosquito net or shade cloth on my tent — atop a plastic gutter that drained into a tube and small reservoir. This simple tool became the "standard fog collector," or SFC, and was mounted at six sites near Topnaar villages along the lower Kuiseb River.[2]

Rooftop reservoirs: *Irony at Wlotskasbaken, where each expensive house had colorfully painted its own, precious, individual water tower, which got filled by expensive tanker trucks, all of which surrounded by dripping condensation from the thick fog that no one bothered to capture.*

Since the trenches and beetles faced Northwest, so did the SFCs. Only later did the experimenters learn the complexities behind the mechanisms of the Namib fog: coastal fog comes in from the SW; the resulting low stratus cloud is transported inland by a NW wind; ground winds shift from NW to SE to NNE just before the fog arrives. In other words, the fog screens, raised off the ground, should have faced NNE. Since they were deployed NW, the pilot underestimated the potential yield.

Mercifully, the pilot study's yield was still impressive, ranging from half a liter to a record of three liters per day. The average was an easy to remember 'liter per square meter.' What's more, the fog appeared thicker, wetter, and more frequent in inverse proportion to the rainfall. I licked my lips. Fog exceeded rain by seven times at

[2] While morally understandable, aiming a new tool at the water-scarce poor has a severe marketing drawback that paradoxically works against technological success. Like the urine-diversion toilet, it automatically gets identified as a low-status instrument. So the poor consider it only something lowly and temporary until they can afford 'what the affluent have.' And the more affluent don't want to go near it, lest it lower their property values. Ironically, the best approach might be to bribe the wealthiest citizens of Swakopmund and high-end desert resorts to install fog-collection devices on their roofs, right next to DSTV satellite dishes. They don't need them. But soon the 'fog-collection device' would become a new status symbol that everyone, rich or poor, would save up to eventually purchase.

the coast, and twice as much inland. It was more predictable, too. Coastal fog occurs 200 nights a year. In the most intriguing correlation, from my perspective, here inland, near Goababeb the 'fog season' coincided with the period of highest groundwater salinity. That meant that when the limited groundwater was at its most brackish, it could be 'diluted' or sweetened with pure fog water.

I could almost taste it. Fog water is quite pure and of neutral pH. *But*. The same wind that sometimes carried fog also brought other unwanted debris. The screens accumulated dust and wind-blown salts that would get washed off by fog water. The initial rinse off the collector, after a non-foggy period, was turbid, brackish and barely fit for humans, although fine for livestock or gardening.

The upshot: "Despite the poor quality and quantity of traditional sources of freshwater, fog proved its potential to become a new opportunity to resolve rural water scarcity on the edge of the desert, but only to supplement traditional sources," said DRFN's Shanyengana.

* * *

By this time my mind was not in peak condition. I had a pounding headache. I could see Gobabeb's pilot-project fog harvesters in the distance, and was hopeful, but now wary. I have always been suspicious of the 'techno-fix' approach to development. I knew well that massive, top-down projects tended, not surprisingly, to benefit only the top, not the down. I've learned to guard against my susceptibility to liberal populist enterprises and causes that 'make sense,' but that have not been given enough time to mature, and which may or may not prove sustainable over time (some of these are mentioned or explored in JGW-5, 8, 9, 13). The Namib is checkered with the remains of water projects — hand-dug wells, boreholes, windmills, diesel engines, solar pumps, evaporative salt plants, etc. — that appeared sensible at the time of proposal, but for some reason or other had been allowed to fall into ruin despite the constant need to find water.

Elias 'Charlie' Shanyengana: *"We just need to put in a bit more to consolidate our efforts and show where fog harvesting can work."*

Indeed, when I checked the fate of earlier fog-harvest projects, the future looked bleak. I learned that four years after it started up, the fog-collection system of the fishing village of Chungungo, Chile, was not working properly. Screens were dirty. Mesh was damaged. Pipes were clogged. When the water committee asked for volunteers to maintain the fog-collectors, no one stepped forward, claiming they could not afford the time away from fishing tasks. A similar 'indigenous-community' venture in Pachamama Grande in Ecuador had also gone belly-up after no one repaired damage from strong winds. The locals lacked not only basic tools such as screwdrivers and hammers, but the mechanical adroitness to use them.

Vilho 'Snake" Mtuleni: *"We have good, affordable material, and technology. A weak point remains how to keep these [collectors] clean and upright when a sudden sandstorm comes along."*

Scale did not seem to be the determinant of success or failure; though small, these projects had been 'top-down' from the Northern to Southern hemisphere, by distant do-gooders who left too soon. In a damning retrospective, researchers Brad Henderson and Debbie Falk noted of the Ecuador community: "The people have now seen two water projects established in their community at significant cost and both have ceased to work. Future efforts likely will be met with increased skepticism and less interest on their part. Do the people there now feel more, or less, able to bring about change in their lives?"

In short, fog-water 'potential' sounds great, but the proof of the puddle is in the drinking. Of course, there were real differences between Namibian fog-water experiments and the foggy attempts

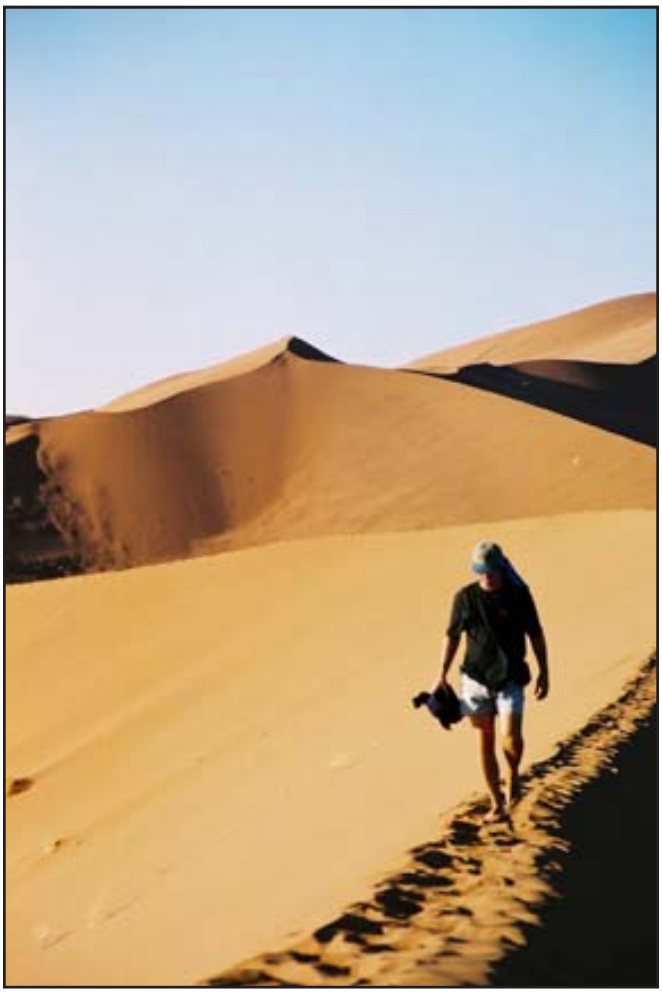
in other countries. First, the others had been grafted onto a local situation by a foreign NGO, which left shortly after installation. Here, fog-collection was evolving through a symbiotic partnership between an indigenous community and a skilled, educated, multi-disciplinary team devoted to long-term processes. Second, both parties shared the risks and rewards of mutual interdependence; with success, they could stay on. Third, the effort here was driven not by 'better hygiene' or 'increased economic diversity,' but by *survival*, which tends to concentrate mind and will. Fourth, it was cheap, with low start-up costs. The closest alternative technology, desalination, would bring an eight-fold increase in water fees, which rural and poor Topnaars could not afford. Finally, it had grown almost organically, and continued to unfold, based on local examples. When I caught up with him in Windhoek, Shanyengana had still not let go of the project, but continued to experiment, studying the beetle's hydro-phobic surfaces to imitate and increase potential yield.

That said, everyone I spoke with appeared more concerned with engineering obstacles than with cultural, social and economic needs. Throughout history, no technology has ever delivered water unless it evolved with a society ready, willing and informed enough to use it for itself over the long term.

The scientists at Gobabeb wanted funds with no strings attached. They complained of a Catch-22. "The government only grants funds for practical implementation and not experimental research," said Vilho "Snake" Mtuleni, who helped oversee the project. "The trouble is, we researchers need to experiment in order to find the best practical system. We need to walk before we can run."

All very well, but I needed to taste before I could drink. I had envisioned at least half a liter from the fog collectors. But when I reached Gobabeb, the containers were empty. Two fog-collector screens had been blown down in recent winds. I remained parched, cursing. Fog harvesting appeared stuck in the hobby stage.

Rudolph Dauseb, chair of the Topnaar Community Foundation *worries that "There are two forms of water security, one for people, and another for the landscape from which we live." The Topnaar people can have enough to drink, but without aquifer water for the !nara their culture will dissolve.*



Lawrence of Arabia? No, Numbskull of Namibia: *Neglecting to bring water with you into the desert is not the brightest move you can make. But it drives home the precarious nature of existence in an arid landscape where no one else can help.*

Even if it worked, "The most dangerous thing in the world is when communities are spoon-fed," said Dauseb. "Then people getting water take it for granted. They don't take care of it. They don't realize it is up to them and no one else to look after the resource."

And that, I thought, was the unique nature of human water politics as opposed to the water resourcefulness of the other plants and animals of the desert. Born with empathy, we assume others — parents, neighbors, governments — will eventually take care of our thirst. Born with logic we assume we can engineer our way out of every problem, with a large or small-scale solution. But the Namib is an empty place caught between logic, and empathy. It forces evolution; and so perhaps the bravest human water decisions also have to be the least humane, bordering on suicidal. Perhaps mothers would have to neglect a child's thirst now and then; a neighbor should refuse to fill a friend's bucket from time to time; the government should cut off research grants and subsidize water deliv-

eries to industry and residents with no exceptions for campaign contributors. Perhaps in a watery paraphrase of Thoreau's libertarian ideal: That Government Governs Best That Governs Driest.

Of course, the inhumane way out is closed to families or communities or governments as we know them. In order to reach the point where fog rolls in and a tap can be turned on, something much messier than 'hard' scientific research is needed. What's called for are interactive social exchanges, a new political culture based on who's responsible for different tasks of water provision, along with self-imposed economic incentives. This would probably not happen, I thought, until or unless both the real and proverbial "well ran dry." The aquifer would have to hit the clay bottom, as it soon will. Coastal cities would have to choke and sputter on salty brine, as they have begun to. Not just one, but tens of thousands of people would have to foolishly find themselves in the desert without water to realize that this was the condition they faced. Every day. Then technology would come. Then we'd mousetrap the atmospheric moisture.

Until then, fog-water harvesting remained elusive, just out of reach. It reminded me of the many 'obvious' water solutions that I'd seen several days before: vast, shallow lakes glimmering in the recesses of sandblasted gravel plains, lakes that reflected clouds, lakes that receded and emptied as I drove toward them. I had laughed to see my first mirages. But I had also seen cities booming on the edge of the Namib. Those were not mirages, nor the product of my fevered imagination. They seemed unconcerned by their precarious dependency.

I felt deep affection for the central Namib, but not at the risk of cerebral hemorrhage. I didn't want to become that desiccated banana peel. I retreated south toward my camp by the 'river,' staggering over to where I'd stashed a few gallons of water in the shade. It was warm, and I had to add a squeeze of lemon to cover the brackish taste. When it was almost gone, I would have to depart as well. Maybe humans did not belong here. Maybe the place should remain only a temporary source of inspiration for biblical figures and modern poets. And for thirsty, absent-minded ICWA correspondents coming here only to watch their futuristic ideals retreat before them the closer they approached.

Only the local 'Romans' remained, doing what they always do. The beetles scurried about from shade to shade. The Bushman grass bowed down under a breeze. A gecko raced after a butterfly. Others hibernated in their cool dark holes, waiting for the night for forage or fog. They carried on as they had for hundreds of centuries. They had not noticed my arrival and would not mourn my departure.

Still, there were the Topnaars. They had been here for roughly 1,000 years. If the groundwater ran out, if the aquifers were depleted, if the cities could not afford to harness the fog or desalt the water and emptied into ghost towns on the coast, I wondered if the Namib's only traditional human residents could remain another millennium.

Dauseb thought so. "We're not too shy to turn back to the old ways," he said, smiling. "We'll scavenge a !nara plant still growing wild somewhere, although I hope it doesn't come to that. But we're not shy. If the government closes the pipes tomorrow, we'll make a hole in the riverbed until we find and get water from that, however deep we have to dig. Or we'll squeeze fog from leather. We'll find a way to stay. This is home." ❑

Desert Defiance: *Even a small, drab clump of dune grass, curled dry in the day then capturing fog and taking on moisture in the night, becomes a small act of insolence, an island of life amid an expanse of non-life. It offers courage, and inspiration.*

INSTITUTE OF CURRENT WORLD AFFAIRS

Fellows and their Activities

Alexander Brenner (June 2003 - 2005) • **EAST ASIA**
Alex received a B.A. in History from Yale in 1998 and has just completed a Master's degree in China Studies and International Economics at the Johns Hopkins School of Advanced International Studies. He is prepariing for his two-year ICWA fellowship in China with four months of intensive Mandarin-language study in Beijing.His fellowship will focus on the impact of a new government and a new membership in the World Trade Organization on Chinese citizens, institutions and regions both inside and far from the capital.

Martha Farmelo (August 2001- 2003) • **ARGENTINA**
A Georgetown graduate (major: psychology; minor, Spanish) with a Master's in Public Affairs from the Woodrow Wilson School at Princeton, Martha is the Institute's Suzanne Ecke McColl Fellow studying gender and public policy issues in Argentina. Married to an Argentine economist and mother of a small son, Martha has been involved with Latin America all her professional life, having worked with Catholic Relief Services and the Inter-American Development Bank in Costa Rica, with Human Rights Watch in Ecuador and the Inter-American Foundation in El Salvador, Uruguay and at the UN World Conference on Women in Beijing.

Andrew Rice (May 2002 - 2004) • **UGANDA**
A former staff writer for the *New York Observer* and a reporter for the *Philadelphia Inquirer* and the Washington Bureau of *Newsday*, Andrew is spending two years in east-central Africa, watching, waiting and reporting the possibility that the much-anticipated "African Renaissance" might begin with the administration of President Yoweri Museveni. Andrew won a B.A. in Government from Georgetown (minor: Theology) in 1997 after having spent a semester at Charles University in Prague, where he served as an intern for *Velvet* magazine and later traveled, experienced and wrote about the conflict in the Balkans.

Matthew Rudolph (January 2004-2006) • **INDIA**
When work toward a Cornell Ph.D. in International Relations is finished, Matthew will begin two years as a Phillips Talbot South Asia Fellow looking into the securitization and development of the Indian economy.

Matthew Z. Wheeler (October 2002-2004) • **SOUTHEAST ASIA**
A former research assistant for the Rand Corporation, Matt is spending two years looking into proposals, plans and realities of regional integration (and disintegration) along the Mekong River, from China to the sea at Vietnam. With a B.A. in liberal arts from Sarah Lawrence and an M.A. from Harvard in East Asian studies (as well as a year-long Blakemore Fellowship in Thai language studies) Matt is also examining long- and short-term conflicts in Burma, Thailand, Laos and Cambodia.

James G. Workman (January 2002 - 2004) • **SOUTHERN AFRICA**
A policy strategist on national restoration initiatives for Interior Secretary Bruce Babbitt from 1998 to 2000, Jamie is an ICWA Donors' Fellow looking at southern African nations (South Africa, Botswana, Mozambique, Zambia and, maybe, Zimbabwe) through their utilization and conservation of fresh-water supplies. A Yale graduate (History; 1990) who spent his junior year at Oxford, Jamie won a journalism fellowship at the Poynter Institute for Media Studies and wrote for the *New Republic* and *Washington Business Journal* before his years with Babbitt. Since then he has served as a Senior Advisor for the World Commission on Dams in Cape Town, South Africa.

ICWA Letters **(ISSN 1083-429X)** are published by the Institute of Current World Affairs Inc., a 501(c)(3) exempt operating foundation incorporated in New York State with offices located at 4 West Wheelock St., Hanover, NH 03755. The letters are provided free of charge to members of ICWA and are available to libraries and professional researchers by subscription.

Phone: (603) 643-5548
E-Mail: ICWA@valley.net
Fax: (603) 643-9599
Web Site: www.icwa.org

Author: Workman, James G
Title: ICWA Letters - Sub-Saharan Africa
ISSN: 1083-429X
Imprint: Institute of Current World Affairs, Hanover, NH
Material Type: Serial
Language: English
Frequency: Monthly
Other Regions: East Asia; South Asia; Mideast/North Africa; Europe/Russia;The Americas

Institute Fellows are chosen on the basis of character, previous experience and promise. They are young professionals funded to spend a minimum of two years carrying out self-designed programs of study and writing outside the United States. The Fellows are required to report their findings and experiences from the field once a month. They can write on any subject, as formally or informally as they wish. The result is a unique form of reporting, analysis and periodic assessment of international events and issues.