A Brief report on the Spread of the Soil and Water Management Systems Pioneered by Mr. Zephaniah Phiri in Mazvihwa Communal Area, Zvishavane District

K.B. Wilson

DRAFT, June, 2012

Background

In the period of 1986-1987 the innovative water harvester from Runde Communal Area, Mr. Zephaniah Phiri, was invited to join the research team in Mazvihwa to explore agro-ecological solutions to soil and water management issues. During this period he encouraged farmers to treat soil erosion not only as a problem of government cause and solution but as something they could understand and respond to themselves. Mr. Phiri worked closely across indigenous and western ecological knowledge systems and conceived a number of his key ideas through this highly participatory process, including his infiltration pits. In the five or so years that he visited in area, including through Zvishavane Water Projects (ZWP), a local NGO subsequently established with Mr. Phiri, he raised community sensitivity to these issues alongside local activists such as the late Mr. Chibidi and imparted numerous technical skills and inspiration for the building of wells and small dams. Furthermore a number of farmers in Mazvihwa got to visit Mr. Phiri's own fields under organized exchange visits by the action research team and other informal efforts. (Calculations based upon his surviving visitors' books found about 8000 people from almost every district of Zimbabwe have visited his farm along with people from 14 African countries and all over the world.) On the other hand it was not possible for ZWP or others to directly promote innovation in natural wetlands as Mr. Phiri was doing on his own lands because of government environmental regulations and ideological focus on seed and chemicals rather than soil and water. Instead of working with soil and water, the focus therefore became the "water project". As of the mid 1990s there were dozens of community well and small dam projects in Mazvihwa (as elsewhere) facilitated by Mr. Phiri but very little individual action by farmers. This dove-tailed with government and NGO development policies in the area which also included community projects to manage gully erosion. Many of these projects were driven by the competent technical staff from government (and increasingly NGOs) and were underwritten by food for work programs. Meanwhile garden projects were supported by government and NGOs in the 1980s and 1990s on the basis of establishing collective gardens in approved sites with each woman allocated her own beds. In all these things Mazvihwa was fairly typical of the region, both in terms of government policies and their effects, and in terms of exposure to Mr. Phiri's innovative but policy-constrained messages. It was also typical in that the major changes to the farming system that have occurred over the last decade have done so with zero extension or help from NGOs or government, but instead through indigenous innovation.

Of Extension and Innovation

During the 1990s and early 2000s most farmers in Mazvihwa remain focused on the official approach to increase yields: namely to combine (declining) livestock-based draught to increasingly worn out soils and

ever more erratic low rainfall by applying fertilizer to hybrid maize seed. The approach was rarely successful but new waves of extension staff and NGOs with their packages and enthusiasm (and regular food aid) kept this approach going, riding on the wave of modernization thinking which saw almost all young people in this area completing secondary schooling at this time. In the 2000s this approach fell away with the overall economy. Hybrid seed and fertilizer was only available intermittently and from NGOs; food aid was not sufficient to survive and remittances from the formal economy were inadequate as communities pivoted to migration to South Africa and beyond. The old truths about the march to mono-cultural progress were no longer captivating. A dramatic shift therefore occurred in the local production system away from hybrid maize to open-pollinated varieties sorghum in a system much more agrobiodiverse and ecologically-adapted, capitalizing on increases in legume use and a shift from outfields to home fields where nutrients and other inputs could be more intimately managed. This strategy was coupled with dramatic changes in settlement and land use as people spilled across the Save River into former commercial cattle ranches to clear new fields, and a generation of young people settled much of the remaining grazing land blocks within Mazvihwa. Despite the appalling circumstances under which this shift occurred, which included the central brunt of adult mortality from AIDS, families survived astonishingly well and agricultural productivity increased. Again this has been a pattern over much of south central Zimbabwe, and possibly more of the country. One of the critical factors in this success was the widespread adoption of the kinds of water-soil management systems that Mr. Phiri had shared with this and other communities across Zimbabwe a generation previously. This adoption happened without the involvement of the NGO sector which while promoting "conservation agriculture" has become peculiarly obsessed with double digging and the like, rather than focusing on water as the critical constraint.

As has apparently been the pattern in other Communal Areas the first wave of expansion of Mr. Phiri type initiatives in the 1990s was led by a handful of people in each community. In Mazvihwa these individuals included Mr. Banda, who adapted the approach to the heavy soils of the Mazvihwa plain or "deve" in an environment very different to that of Mr. Phiri's sandveld and vleis in Runde. Meanwhile in the sandveld areas of Mazvihwa farmers like Mr. Magwisanye and Mr. Takura Moyo innovated around similar themes of wells, ponds and gravity-fed irrigation systems. Most of these initiatives began in the 1990s and also involved considerable attention to on-farm agro-forestry and orchards, responding in part to the work of the late Mr. Mathou Chakavanda and his nurseries for both indigenous and exotic trees. These farmers were each exceptional and gained considerable respect in Mazvihwa for carving a new furrow. But it was not so much aping a few early innovators that drove what happened next. Rather it was extreme need, long standing common sense and indigenous knowledge, and an openness to change during the crisis years of the 2000s that led most farmers to change tack. Water was central. With rainfall increasingly erratic and always limiting in this semi-arid system with few years receiving more than 500mm of rain at only around 700-1000m altitude plant available moisture is the dominant driver in this system. Population was several times that which they used to support with an extensive highly variable small grain (millet) production system that thrived from the 1930s to the 1970s that had been based on gambling on good rains followed by many years of storage for the droughts. Farmers now had to intensify on existing land, and this meant diversifying and managing remaining soil and water more intensively. What Mr. Phiri and his followers did was to fertilize peoples thinking and

confidence and to provide some excellent and flexible water harvesting and management approaches. What happened next in Mazvihwa is quite dramatic and is probably consonant with what has happened across much of Zimbabwe, at least according to anecdotal reports. In some places important efforts had been made in the 1990s to promote water harvesting and related agronomic approaches, including Mr. Phiri's infiltration pits, such as by the ITDG team in neighboring Chivi. All of this added to the capacity for regional innovation.

Varying Ecologies of Water and Farming in Mazvihwa

Mazvihwa includes both of the main agro-ecological systems of south central Zimbabwe: the comparatively fertile clay rich plains historically dominated by mopane and considered the "deve" where eutrophic savannah dynamics shape production in a water-constrained system; and the sandveld of the broken granite hills where soils are infertile except where clay and organic matter accumulates in natural bottom lands called vleis, makuvi or dambos. In the sandveld region water is much more mobile in the soil horizons, especially in sloping areas and there are many more opportunities to tap, channel and store it. Meanwhile efforts to increase water availability without improving soil CEC and nutrient status through the management of clay and organic inputs are unproductive. On the clay soils of the plains surface run-off is the main issue in water loss to the system, and enhancing infiltration is the crucial issue for improving crop growth. The pattern of change at the farmer level in the 2000s was not surprisingly different in these two regions. Within the sandveld areas much innovation among those farmers with access to vlei areas looked similar to that developed by Mr. Phiri. Run off from exposed granite, sandy pediments and any gullies, would be diverted and encouraged to infiltrate by swales and pits and then stored in small ponds secured by bands of impermeable clay; available water would then be carefully redistributed in small areas to support permanent plant cover in legume rich orchard-based agro-forestry systems and intensive soil management of farm and garden sites with the field areas as a whole being highly heterogeneous and diverse. On the clayveld the opportunities were less obvious and fewer people are exploring them. Nevertheless a new generation of farmers went after the gullies and other areas of run off to capture and infiltrate water and explored how infiltration pits could increase crop-available moisture.

To explore further this pattern of change and innovation in the two contrasting ecosystems (and on a quantitative basis) a set of questions and observations of farmer innovation at the homestead and field level were undertaken in the two zones in 2010/2011 by Abraham Mawere Ndhlovu with a sample of 124 households that he and Dr. Wilson had been monitoring since 1986.

Although this sample contained none of the leading innovators in Mazvihwa it was striking that almost all households were now involved in some form of water harvesting in this community. Those households which were not tended to comprise either the elderly and marginal, or young people in new homes who were mainly involved in building their lives, often outside of the area. The backbone of medium-large established households in Mazvihwa – the people who feed the wider community – are now engaged at one level or another in water harvesting, and generally indicated great enthusiasm for

its expansion on the basis of success in the last five to ten years. These numbers do not refer to community-wide efforts – which are widespread and normal – they refer instead to hundreds or thousands of hours of family labor digging around on homestead and individual field areas.

On-Farm Management of Run-Off and Infiltration

Almost all farmers in Mazvihwa are now acutely sensitive to soil erosion and run-off on their land. The authoritarian approaches of past governments created some resistance to reflecting and acting upon this back in the 1980s, but now it is routine, at an individual as well as a community level. (Everyone in Mazvihwa gets involved in community level erosion management projects also.) Run-off fueled erosion is particularly a problem on clayveld, and 47% of households had healed gullies on their homestead sites or in their fields in recent years. In the 1980s such measures were considered only in the ranting of mavericks. Healing a gully is a massive task requiring considerable strategy as well as very hard work. On sandveld the figure is also substantial: 40%. Gulley erosion is rampant on the clayveld of Mazvihwa, entering a further cycle were renewed woodland removal as settlement and brushwood fencing expands (reversing trends in the 1990s), but it is remarkable how rapidly people are working to tackle it.

Quite apart from preventing negative impacts some 38% of clayveld and 58% of sandveld households are now involved in significant management efforts to positively manage run-off and enhance water infiltration in their field and homestead areas. Most common here is the digging of infiltration pits, which people call Phiri Pits, often hundreds of them, usually measuring one to several metres in length, around a metre wide and perhaps 30-50cms deep. These are dug wherever water accumulates, naturally or by design, particularly behind the swale “contour ridges” which this community were obliged by government to dig under forced labor in the 1960s, and which otherwise shed water from the field under the mistaken framework that storm water drains are useful in this ecology. Around 30% of households on clayveld and 50% on sandveld have dug these pits. Rather poignantly many men dug these as investments to help their families as they slowly died of AIDs. In addition to the Phiri Pits around 17% of households on both soil types have made their own new swales to guide and store water, and a third of sandveld households have re-aligned the historic government contour ridges to do this more effectively (about 15% have done this on clayveld). Even more dramatically about a quarter of sandveld farmers have conceived mechanisms for capturing and redirecting the run off in soil erosion gullies into their homes and fields. This is a fascinating strategy that both takes advantage of increasing run off in grazing and woodland areas in order to increase water availability on agricultural land, while at the same time preventing further downstream gullying and siltation of the rivers. This figurefor gully-harvesting is much lower on clayveld (8%), but outside of the sample villages but elsewhere in Mazvihwa there are whole communities on these soil types – such as in Muringi – where in the last few years they have perfected ways of doing this and we can expect a rapid expansion of this approach in the area and region.

Developing Micro-Irrigation Water Supplies

Some 31% of sandveld households have now developed micro-irrigation and related water sources in their homes and fields. Back in the mid-1980s all that was available were a few wells whose primary

focus was drinking water or very small gardens. Most of the current sources are shallow wells that depend on the re-charge of the vlei wetlands that these farmers now carefully manage. 22% of households have these wells on their homesteads, and 24% in their fields. In addition to the wells some 13% now have ponds or small dams in their fields or homestead sites. This number is again set to rise considerably as the current generation demonstrates that these work and can be developed by ordinary farmers and not just wild enthusiasts like Mr Phiri. On the clayveld it is much harder to develop such water supplies, and these numbers are currently at 4%, 5% and 6% respectively. Nevertheless even ten years ago it was almost unimaginable that any clayveld farmers would develop such supplies. In general most gardening on clayveld is away from the fields and homesteads typically on the raised banks of major rivers from which water is drawn by bucket from holes in the sand or small dams. Some 88% of households have these gardens on clayveld, whose origin dates back to the 1980s, but which have expanded dramatically in recent years. (The comparative figure is 77% for sandveld). What makes the difference is that on sandveld 33% of farmers are able to have irrigated vegetable gardens in their regular fields (because of the systems described above) and these are often much the largest gardens available (only 4% can do so on clayveld). Because of the lack of opportunity to garden with water in their fields some 44% of clayveld households have developed micro-gardens in their homesteads (on average about 20m squared, and often less) upon which they produce tomatoes and green leafed vegetables with water carted or carried from rivers and boreholes (or waste/run-off within the home).

Overall water delivery systems are rudimentary. Only one farmer in this sample has a gravity-based irrigation system and another a hand pump. Watering is achieved through natural infiltration (with farmers targeting crops as appropriate to privileged sites) and supplemented by hand drawn buckets. The next frontier with water supplies will be the development of cheap but efficient distribution systems. An innovative self-taught engineer, Johnson Madyakuseni, whose family are farmers in Mazvihwa (and who is another graduate of the research team with Mr. Phiri) is experimenting with hand pumps with this in mind. These systems will supplement but not replace agronomic techniques to maximize soil moisture retention in these small wetland areas (usually smaller than a hectare), which typically include numerous species of cane and tree to reduce wind and provide shade, high soil organic matter, mulching and cover crops, and close attention to natural seasonal cycles to minimize irrigation requirements.

At household level we are not seeing the development of roof-fed water tanks (hovering currently around 2%) or underground cisterns for waste water in homes (similarly rare), two methods that Mr. Phiri and many others have been promoting. There is extensive roof sheeting in Mazvihwa but guttering and tank building are still seen as expensive and out of reach. Technical innovation may change this. Currently people use simple methods of shaping the ground at their homesteads to drive run-off into infiltration areas to support their home orchards, which have exploded in importance over the last generation. This is particularly important on clayveld where trees fruit poorly and even die in drought years, where 44% of households have now set up systems to direct rainfall and waste water to their orchards and other homestead plants (on sandveld the percentage is 33%).

A New Development Agenda

The economic crisis of the 2000s drove many young people from Mazvihwa out of the country in search of employment, using the education they had gleaned in the 1980s and 1990s to survive in South Africa and beyond, and where possible keep families at home going through remittances. While ultimately successful this was typically painful as migrants suffered many indignities and worse. Nevertheless even this suffering came to be seen as a mark of dignity, especially for young men anxious to be seen as capable of building families and lives in a generally hostile environment. For them the whole purpose of education and development was to escape agriculture; furthermore if there was to be any dignity in agriculture it would be "modern" farming, which in the context of this region is that espoused by the government's master farmer program: monoculture with "improved" varieties and agro-chemicals produced for cash sale. What has changed over this last decade is considerable. Producing food in a resilient fashion has become seen as an important mark of a successful man and household. Diversity and traditional varieties are once again seen as relevant and valuable because of their relevant properties. Knowledge of biological and sustainable ways of producing in the face of a hostile unpredictable ecology is seen to have dignity and to be about innovation rather than tradition. And above all the making of strategic and massive investments of hard male labor in moving soil about a landscape in order to manage water and an integrated agro-ecological system is being seen as an equal demonstration of family-creating prowess as is making a success of finding work in South Africa or Namibia. This cultural shift offers much promise to a new generation of Mazvihwans by driving economic and agro-ecological intensification in their complex dry and beautiful lands. And it can bring men and women, clans and children, back together again from a long period of scattering and strife. Mr. Phiri and the other innovators who have touched this region have much to be excited and proud about. "Oh how it makes me wish to be young again" he has been heard to say as he ponders it! If what's happened in Mazvihwa is as widespread as it seems, millions of Zimbabweans are now using his techniques; many are taking new purpose to their lives with their lands upon his water harvesting insight.