WATER RESEARCH COMMISSION

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The WRC operates in terms of the Water Research Act (Act 34 of 1971) and its mandate is to support water research and development as well as the building of a sustainable water research capacity in South Africa.

TECHNICAL BRIEF

Rainwater harvesting

Review of indigenous rainwater harvesting and conservation practices

South Africa has a rich indigenous rainwater harvesting and conservation history, as a WRC-funded study shows.

Rainwater harvesting – a long history

Water harvesting, which is currently commanding growing interest within the scientific domain, has a long history. Indigenous water harvesting can be traced back to ancient civilisation, having been practiced first within communities in Northern Africa and the more arid parts of Asia, where the practice was geared predominantly towards crop farming.

In Southern Africa, knowledge and skills were either accumulated independently over an extended period of a few millennia or transferred more directly to settlements in the region through conquest and colonialism. Subsequent movements of the techniques were influenced by farming methods and settlement patterns, which, in turn, were determined by ecology and climate.

While the literature captures long-term change and progression with regard to indigenous water-harvesting practice in general terms, little technical detail relating to Southern Africa is evident. There is mention of water diversion and conservation practices for purposes of irrigation or supplementary watering, but practically no detailed information is available on techniques, site locations or visual appearance of structures associated with indigenous water harvesting and conservation practices.

Accordingly, the literature has failed to identify any specific sites that would be useful for the documenting of truly indigenous case studies. Therefore, it has been necessary to seek information about particular sites through networking with practitioners, researchers and historians currently active in the field of agricultural and irrigation development.

Water harvesting practices in South Africa

Information gathered revealed the existence of 13 current practices across the breadth of South Africa. Ten of these have been documented in detail. Of these, only one (***Gelesha*** practice) is distinctly indigenous. Five are considered indigenised (in that they are the product of local and external influences), while the remaining four are essentially contemporary scientific methods.

The processes cover scales varying from tens of thousands of hectares (***saaidamme***) to microcatchments of a few square metres in size. In processing the gathered information, it became evident that the classification of rainwater harvesting methods in South Arica lacked consistency. Consequently, a categorisation, based on international convention and South African parameters has been presented.

Why so few indigenous practices?

The general lack of information in literature pertaining to Southern Africa is indicative of the relatively low degree of prevalence of local indigenous water-harvesting techniques. The evolution of food production in Northern Africa, the Middle East and Southern Europe some 7 000 years ago was greatly influenced by Levalloisian, a technique of manufacturing stone tools.

This technique was also instrumental in the evolution of settlement, construction of canals and water-diversion mechanisms and, in the long run, the gradual evolution of irrigation practices in the drier areas of Egypt, Tunisia and the Middle East.

Conversely, the wetter lush grasslands scrub sub-Saharan vegetation and environment presented considerable potential for evolution of hunter-gatherers and pastoral peoples with their livestock. Being relatively sparsely populated by mobile hunters and gatherers, Southern Africa experienced no concentrated settlements and sustained farming practices up until the early Iron Age period some 1 500 years ago.

By this stage, iron-working and crop production had spread to, and was taking root in, vast regions of central, eastern and

southern Africa mainly through migrations of small farming communities. With continuing southward migrations, skills and techniques were transferred and more land was gradually subjected to settlement and farming demands.

Well-established farming practices were in evidence by the late Iron Age. These included water and moisture preservation for soil cultivation.

Significantly, in South Africa, farming development took root in the wetter eastern half of the region. With rainfall exceeding 700 mm a year in this area, there was little requirement for water-harvesting innovations as found in drier areas of the world.

Value of indigenous techniques

As previously indicated, relatively few indigenous or indigenised water harvesting practices are found within South Africa. Those that occur are mostly variations of much older techniques encountered in other arid parts of the world. Two practices are of particular interest, namely ***Gelesha*** and ***Saaidamme***.

Gelesha (post-harvesting tilling for infiltration) is a truly indigenous practice. It is functionally similar to newer techniques such as mulching or trench-bed gardening. In these, the expressed intention is to create conditions for maximum retention of rainfall and in the case of trench beds, to concentrate runoff.

Gelesha, like these contemporary moisture-holding practices, can be used in any area suitable for crop production. Significantly, the practice demonstrates that techniques that are considered contemporary in fact go back in time and have deep African roots.

Saaidamme (flood-spate irrigation ponds) extend over some 35 000 ha in the dry Northern Cape. They are remarkable because of the scale of the practice and the dramatic nature of the large flood-flow diversions that take place during flood events which occur only every other year or so.

Replication of saaidamme in order to increase the extent of the practice is limited by the requirement for deep, flat soils in close proximity to zones of very high runoff. This seems unlikely to be found to the same extent in other parts of South Africa.

Nevertheless, the existence of the saaidamme serves as an inspirational example of what can be done in areas which seem to have rainfall that is hopelessly inadequate to support crop production. The practice has in fact served to provide inspiration for the development of smaller-scale, but conceptually similar, techniques that do have wider replicability across South Africa. Early-stage experimentation being conducted by the University of the Free State, for example, has the objective of transporting runoff, via channels, from hilly outcrops (***koppies***) to cultivated fields some kilometres away.

Learning from the past

The exercise in documenting water-harvesting practices has revealed opportunities for future research. Some relate to the saaidamme and the potential for further innovation, refinement, documentation and knowledge dissemination in this regard. It is particularly important that the actual area under the saaidamme floodwater harvesting system be accurately determined and that the reason be established why, from a soil-water-plant perspective, the saaidamme system works as well as it does.

A current hypothesis, that the reason lies in an appropriate combination of flood-spate irrigation plus water provision from localised shallow-aquifers, requires investigation.

Another topic that merits further investigation is the marked difference in prevalence of water-harvesting practices between South Africa and countries further to the north. Such an investigation might reveal challenges or barriers that would have to be overcome in order to boost contemporary efforts at promoting rainwater harvesting and conservation.

The process of documenting water-harvesting practices has demonstrated the value of rainwater harvesting and conservation across the socio-economic and cultural spectrum of South Africa, inclusive of resource-poor farmers and fully-fledged commercial farmers. Furthermore, the documentation presents a sound platform for providing direction for new technical interventions and, importantly, placing them in a historical light which could be of value in terms of their sustainability.

Further reading:
To obtain this report and DVD, *Indigenous Water Harvesting and Conservation Practices: Historical Context, Cases and Implications* **(Report No: TT 392/09)**, contact Publications at Tel: (012) 330-0340; Fax: (012) 331-2565; E-mail: orders@wrc.org.za; or Visit: www.wrc.org.za