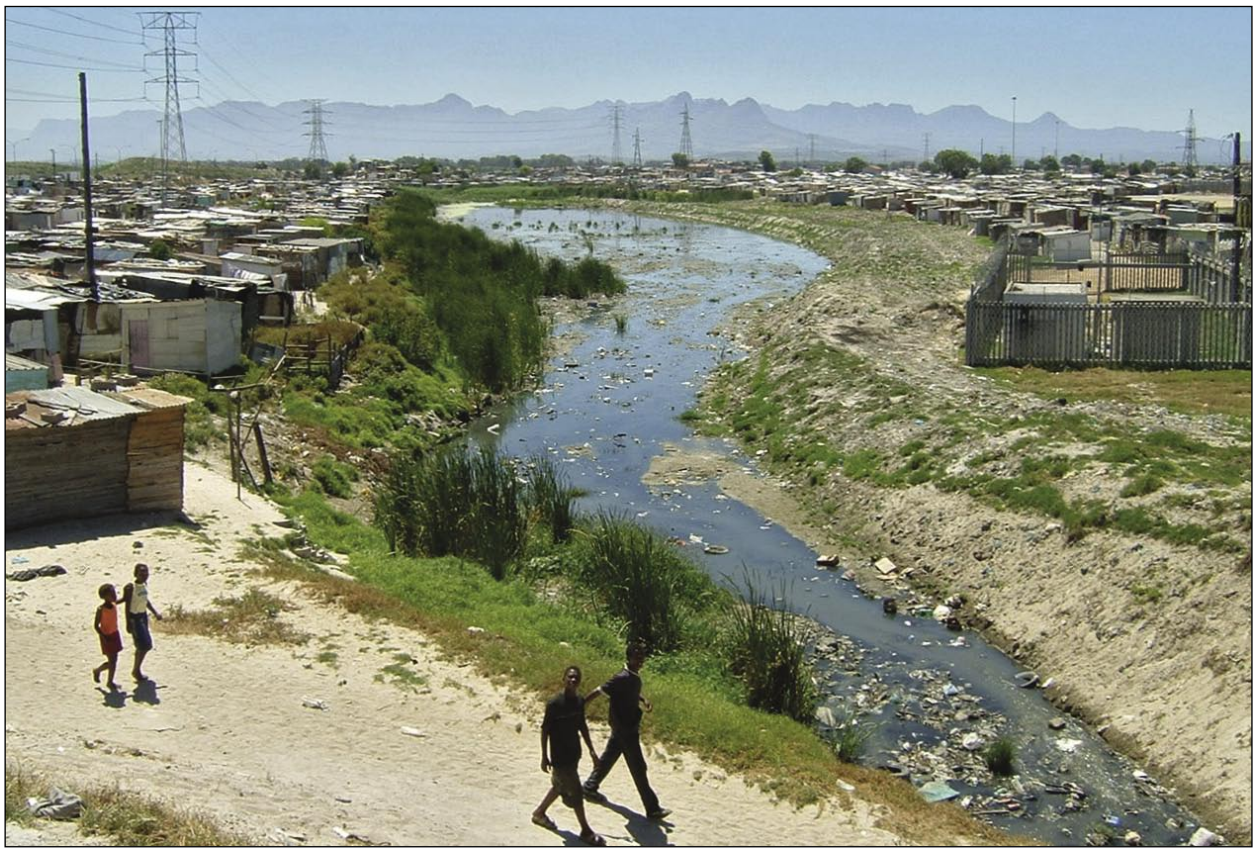

Towards a New Stormwater Management Approach

An investigation into South Africa's research needs regarding urban stormwater drainage and sanitation has not only identified the gaps, but is proposing a new way forward. Report by Neil Armitage, William James and Haneem Hendricks.

The Water Research Commission (WRC) appointed the University of Cape Town to investigate research needs in the fields of urban stormwater drainage and sanitation in South Africa. This was undertaken with a view of assisting the organisation in identifying gaps and aiding it in the development of a new strategic research framework for the funding of relevant research.

The focus was on the urban setting, with particular emphasis on the problems of local informal settlements.

Workshops on the topic were held across the country. In addition, the recommendations for future research contained in the relevant WRC research reports over the last ten years were examined. More information was gleaned from scanning websites of high-profile international research organisations in the field and inspecting papers from selected conference proceedings.

The investigation not only captured perceived research requirements regarding urban drainage management in South Africa but is suggesting the country adopt a new research paradigm.

IDENTIFYING RESEARCH NEEDS

Five main service categories of research requirements (urban stormwater drainage, sanitation, greywater, groundwater and urban rivers) were identified. Several research proposals were captured under each of these categories, with the issue of sanitation generating the largest number of

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The dire need for increased technical capacity is becoming increasingly apparent.

Protecting the country's urban rivers requires more urgent attention.

research issues. Proposals ranged from the creation of infrastructure/asset management systems, improved stormwater modelling, and user-friendly maintenance manuals for small communities to examining indigenous sanitation technologies, investigating groundwater contamination due to low-cost, density housing; investigating cooperative governance of urban rivers, and developing education material.

It became evident during the workshops that a major problem was not the lack of research per se, but the difficulty in identifying and assessing existing documentation. There were also several issues that came up repeatedly.

One was the frustration with the political process, which has resulted in low levels of technical competence at the decision-making process. There is a lack of trust between engineers appointed in the old era and politicians elected in the new, resulting in poor (and possibly inappropriate) service delivery. Linked to this was the continual reference to the lack of capacity in local government coupled with an apparent desire to give a high priority to the provision of houses (and structures) rather than the services to those houses.

Another issue is the vast gulf that exists between the technical competence of large metropolitan areas and the smaller local authorities.

As a consequence, the needs for staff in the two types of authority are vastly different. While large metros require computer-based information management tools that will allow a handful of experts to manage very complex systems, smaller authorities need easy-to-understand instruction manuals to allow for efficient management using staff with modest technical capabilities.

FUTURE URBAN WATER SYSTEMS

Worldwide, urban water problems can be summarised into three categories, namely not enough water, there is water but it is polluted and too much water. Habitat and biodiversity problems appear to be serious and getting worse with evidence of accelerated loss of species. It is possible that long-term sustainable civilisation could be dependent on preventing – or restoring – habitat and biodiversity.

Perhaps the time has come for a new philosophy of design, one where urban design focuses on 'less unsustainable ecosystems' which ideally implies, inter alia:

- Biological equity must determine design;
- Design must reflect bio-regionality;
- Renewable energy systems should be used;
- The living world should be the matrix for all design, which should integrate and mimic living systems; and
- All projects should be beneficial to the planet.

Society should endeavour to design in a manner that examines very long-term changes and impacts (> 100 years), that improves and restores the natural balances and biodiversity, imitates the structure of the natural, native or indigenous system and is good for all parts of the natural system, and finally does not enrich one

individual or group to the distress or impoverishment of another.

All too often, designers use simplistic, short-term models that offer solutions that fit single-minded ideas of economic growth (e.g. what is the minimum culvert diameter?). Complex, long-term and meaningful models open up a greater variety of options (e.g. how are animal populations affected by the culvert?).

TOWARDS A NEW RESEARCH PARADIGM

There is a tendency in South Africa for proposals such as the above to be dismissed as being unaffordable, unsustainable and too risky – and thus irrelevant – in developing and transitional countries. While caution is required, nothing could be further from the truth. South Africa should learn from the mistakes of the developed countries, not repeat them!

Many developed countries are now spending an enormous amount of money dismantling many of the great engineering projects of the past, e.g. channels to drain urban areas, and mitigating the impact of others such as combined sewage. Furthermore, modern technologies, generally called sustainable urban drainage systems (SUDS) in the UK and best management practices in the US, are not necessarily more expensive than conventional design.

It is time for South African researchers to adopt a new research paradigm that focuses on 'less unsustainable ecosystems'. Implicit in this is the concept of integrated urban water management (IUWM) which refers to the practice of managing freshwater, wastewater and stormwater as links within the resource management structure, using an urban area as the unit of management. The closer the urban hydrological cycle mimics the natural hydrological cycle, the less unsustainable it is likely to be. Water supply, sanitation and stormwater drainage cannot be studied independently of one another any longer.

An apparent lack of trust between engineers appointed in the old era and politicians elected in the new is resulting in poor (and possibly inappropriate) service delivery.

It is also important to carry out life-cycle assessments (LCAs). LCAs attempt to look at the total cost of (in this instance) a water service over its entire projected life. The objective is to help managers choose those services that have the least lifecycle costs, thereby ultimately maximising service delivery.

Fortunately for South Africa, much research into the appropriate technologies has already been carried out elsewhere, and much sophisticated software is readily available. What is now required for local researchers is to concentrate on those elements that are lacking in the South African situation.

RECOMMENDATIONS

To achieve the shift towards IUWM several activities can be promoted. This includes, the collection, archiving and presentation of data; as well as in-depth studies of the various different urban communities within South Africa to better understand water behaviour needs, obstacles to development, and ultimately to ensure the selection of appropriate technologies that will be supported.

In-depth studies could also be undertaken into the interaction between urban water quality and quantity; the interaction between urban water supply, sanitation (including greywater), stormwater, groundwater and urban streams; as well as into the development and use of more sophisticated models that, wherever appropriate, take into account sociological and ecological concerns.

In-depth studies of alternative water technologies (their advantages and disadvantages for South Africa); various funding models with respect to water infrastructure (with particular focus on operation and maintenance); and decision-making within the new political arena in South Africa to determine that correct decisions are made should also be considered.

Lastly, there is a need for the development of new materials to promote a better understanding of urban water issues among the different elements of urban society, whether illiterate people in the informal settlements, children in school, working class people, middle class people, industrialists or politicians.