

## Water Research & Education Network (WREN)

**Problem:** Inadequate, unpredictable and contaminated water supplies for agricultural and non-agricultural uses currently rank among the most serious problems in eastern and southern Africa today, a crisis destined to become more serious if climate change predictions are correct. The magnitude of the problem is huge: global water use was projected to increase by 50% between 1995 and 2025 (Rosegrant, Cai, and Cline 2002) while rainfall is predicted to decline appreciably in some of the most densely populated parts of the African continent according to the recent IPCC reports. Not only must water issues be addressed at local, regional, national and international scales, but also proposed solutions must be integrated to avoid unintended consequences whereby water availability might be improved in one locale while creating scarcity elsewhere.

A combination of research, education, community action and effective policies is needed to develop short- and long-term responses. The breadth and extent of the water crisis make solutions difficult especially in developing countries with relatively weak educational and government institutions, miniscule research budgets and limited interdisciplinary and organizational collaboration (often due to budget constraints). The capacity to use the social, natural and engineering sciences to develop effective and acceptable solutions must be enhanced and university graduates must be able to talk to community members, politicians, citizens and to each other. The instructional programs at the universities need to be revamped to include aspects of water management ranging from quantitative engineering skills to effective social interactions with rural residents to the ability to detect water-borne pathogens like *Cryptosporidium parvum*. Participants at all levels will require access to computers for communication and information access accompanied by the skills to use these technologies.

The international dimensions of water problems magnify the complexity of the water problem: increased use of water from the Blue Nile in Ethiopia creates shortfalls for farmers in the Sudan and Egypt and poor farming practices in Kenya affect the fish catch in Lake Victoria by Tanzanians, Ugandans and other Kenyans. However, trans-boundary and regional water disputes are very real and merit consideration.

Although the scope of the water problem is daunting, water scarcity and contamination cannot be ignored. We are proposing to develop an integrated Water Research and Education Network (WREN) that will include African universities, NGOs and government ministries in eastern and southern Africa, the region where the predictions for drought are most dire.

**Proposed Solution:** WREN's goal is to develop the scientific and social capacity and will to develop African solutions to one of the continent's most pressing problems. If we can create a community of informed local resource managers/educators, hydrologists with appreciation for farmers' concerns, policy makers able to understand the complexities of water dynamics and farmers able to change their water use patterns, the project will have been a success. To accomplish these goals, the following are necessary:

1) develop university research and outreach/development capacity [8b<sup>a</sup>], 2) develop and implement community solutions to water management [3b and 2e], and 3) promote dialogue to foster local, national and regional policies that promote water efficiency for sustainable development [1b].

WREN will be an integrated research, development and education program to address complex water issues. A consortium of 8-10 African universities in eastern and southern Africa will be formed with partner development institutions (community organizations, NGOs and government ministries) and developed country universities to provide educational and research backstopping.

An integral part of WREN will be a competitive grants program for water research and conservation programs. The annual calls for proposals will mandate the following: 1) support for graduate student research and undergraduate internships, 2) direct involvement of universities in community water management activities with their development colleagues, and 3) creation and strengthening of university or multi-university water management programs at the graduate and undergraduate levels. No project will be funded that does not include graduate and undergraduate training, community involvement and demonstrable benefits, and rigorous, interdisciplinary science related to water management. Each project will be managed a team that includes a community coordinator from an NGO or local organization and by a research director from a university. An interdisciplinary panel with representation from the academic, development and business communities and with people from within and outside the region will review the proposals to ensure that these goals are met.

The competitive grants program will provide incentives for faculty to become more involved in urgent water issues while simultaneously strengthening the research, teaching and outreach capacities of the universities. Those involved in local water management initiatives will benefit by having access to expertise need to improve water use efficiency and to evaluate the effectiveness of their efforts. By providing support for internships and community-based research, we will address the concerns that today's graduates are long on theory, but short on practical experience. Few competitive grants programs are available for African scientists leaving them too often to play "second fiddle" to their OECD colleagues who have access to better funding alternatives. This program will permit equal partnerships and ensure the capacity to develop sound, science-based water management policies. By explicitly combining research with development, our goal is to ensure that the results directly affect those whose water supplies are threatened.

Some funds will be set aside for multi-national programs similar to the National Science Foundation's Long-Term Environmental Research (LTER) sites to stimulate collaboration on critical watersheds such as Lake Victoria, the Limpopo basin, and the Blue Nile basin. Unlike the LTER sites, development as well as research activities will be expected. An important part of the on-going monitoring inherent in the LTER-like program will be how water use patterns at the household and community levels have changed. One of the difficulties in assessing the effectiveness of environmental programs

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<sup>a</sup> These are the codes from the scenario groupings identified at the Gates Education meeting at Cornell.

in Africa is that the term for most projects is 2-3 years so there are few assessments of the long-term results of a project.

**Costs:** The budget will depend on the magnitude and scope of the grants programs, but the costs of implementing community management activities in 8 – 10 sites, university program revision and development, student support and research costs likely will be in the vicinity of \$ 10 million over 5 years. An additional \$ 1 million should be placed in an escrow account to permit evaluation of the long-term effects of the interventions 10 years after the project is complete.

**Measures of Effectiveness:** The following criteria should be used to evaluate the program:

- 1) Efficiency with which water is harvested and used at the household or watershed scale.
- 2) Community knowledge of options to improve water access and quality.
- 3) Ability of university graduates to function at the community level and scientifically (based on perceptions of community members, government officials and scientific peers).

**Risks:** This is an ambitious project that strives to increase the impact of universities and their graduates on development while improving the efficiency with which water is used at the community level. It is likely that resistance will be encountered at both the community and university levels by those with a stake in the status quo.

### **Reference**

Rosegrant, M., X. Cai, and S.A. Cline. 2002. Global water outlook to 2025. Washington, D.C. and Colombo, Sri Lanka: IFPRI and IWMI.