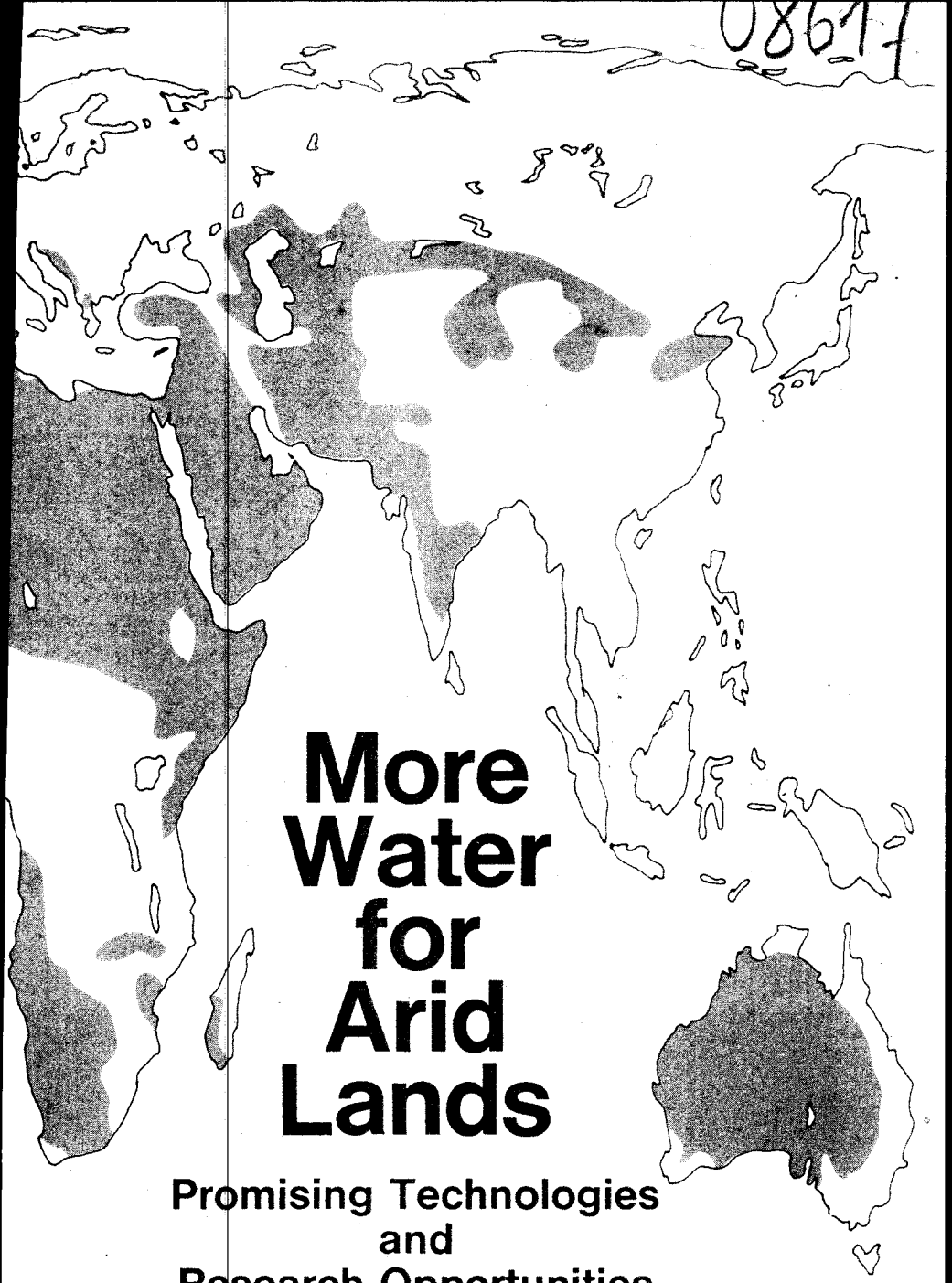

More Water for Arid Lands

Promising Technologies and Research Opportunities

NATIONAL ACADEMY OF SCIENCES

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Report of an Ad Hoc Panel of the
Advisory Committee on Technology Innovation
Board on Science and Technology for International Development
Commission on International Relations

خلاصة

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Preface

Little known but promising technologies for the use and conservation of scarce water supplies in arid areas are the subject of this report. Not a technical handbook, it aims to draw the attention of agricultural and community officials and researchers to opportunities for development projects with probable high social value.

The technologies discussed should, at present, be seen as supplements to, not substitutes for, standard large-scale water supply and management methods. But many have immediate local value for small-scale water development and conservation, especially in remote areas with intermittent rainfall. With further research and adaptation, some of the technologies may prove to be economically competitive with standard methods of increasing the water supply or reducing the demand.

For the convenience of the busy reader, each technology is presented in a separate chapter, and the material is arranged under these topics:

Methods
Advantages
Limitations
Stage of Development
Needed Research and Development
Selected Readings (a short list of reviews and general articles)
Contacts (a list of individuals or organizations the panelists know to be involved in relevant research)

NOTE: Neither the Selected Readings nor the Contacts are meant to be exhaustive.

Several points deserve emphasis:

The panel considers that all the technologies in this report have proved themselves within the individual settings described. When these technologies are applied elsewhere, consideration should be given to unique local conditions that may affect their success. Questions should be asked that cannot all be accounted for in a general report.

The particular choice of technologies examined in the report is not meant to reflect on others, which may be equally worthy of attention. Selection was based on technical merit and potential for application, particularly in developing countries, as seen by the panel. No order of importance is implied by the chapter sequence. Some methods selected are ready for widespread application; for others, the fundamental principles are still being developed. Although most of the ideas discussed are not new, they have as yet had little impact.

In its discussion of the technologies, the panel took heed of their economic parameters but could not consider this subject in specific detail. Attempts to estimate future cost in the vastly different economic and ecological environments of the several dozen countries beset with the problem of aridity would have bogged down the discussions, as would consideration of political, institutional, and social factors. Accordingly, this report confines itself to a technical overview, leaving to the reader the task of weighing the technical prescriptions in the light of his country's resources and capabilities.

The Ad Hoc Panel on Promising Technologies for Arid-Land Water Development formulated this report at a meeting in Tucson, Arizona, in October 1973. Each selected technology was evaluated and written up before the meeting by an individual committee member, in collaboration with the NAS staff; each paper was reviewed by the others, discussed during the meeting, and modified according to the will of the panel as a whole. This document, therefore, reflects a consensus.

The panel is indebted to Tresa Bass and Mary Jane Koob, who acted as administrative secretaries for the meeting and for production of the report, and to A. Richard Kassander, Jr., and Jack D. Johnson of the University of Arizona for local arrangements in Tucson. The report draft was prepared for publication by Jane Lecht, and the Arabic translation by Mohammed Sageer.

This project is part of an experiment to determine ways scientists and engineers can make a more effective contribution to economic-development activities, particularly by translating recent research results into a usable form for decision makers. If you wish to comment on this report and especially if you find it useful in your work, please communicate with the staff officer, Dr. Noel Vietmeyer, National Academy of Sciences – National Research Council, 2101 Constitution Avenue, JH 215, Washington, D.C. 20418, USA.

Two systems of ancient agriculture in the Negev–narrow terraced wadis and farm units with small watersheds–show a most rational and wise use of the available natural resources. The ancient farmer fitted his artificially created agricultural ecosystems into nature and used landscape and topography to his best advantage without damaging his environment. He neither caused erosion nor brought about salination of his agricultural soils. By using the runoff he tamed the flood torrents and prevented the damage that uncontrolled floods usually produce. He certainly did not overirrigate, because his water resources were limited, and in this case as in many others, limitation is the mother of good management. The methods of the ancient civilizations of providing drinking water are another example of a most rational use of nature's resources. The same is true of the [qanat], which merits our special admiration because of the great technical skill and ingenuity involved in its construction. In all these cases man learned from his natural environment and applied what he had observed by imitating nature and sometimes improving on it. This is most obvious in the case of runoff agriculture. Most of the plant associations of the natural desert ecosystems live on runoff water. A good observer will notice this and may apply this knowledge to grow cultivated plants to his own benefit.

Michael Evenari, Leslie Shanan, and Naphtali Tadmor.
The Negev: The Challenge of a Desert.

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