studies of these and other matters are not yet sufficient to support well-rounded judgments. All will agree, one may hope, with the main argument of the book: that full consideration should be given to multiple means of carrying out multiple purposes.

For many years White has been urging the use of multiple means to prevent flood losses, and he can take substantial credit for the increasing consideration they are receiving. Multiple means, as he indicates, are available to fulfill most other purposes of water resource management, and science and technology are providing additional means each year. The wider the range of practicable alternatives, the more sensitive management can be to complex human preferences. And to the extent that multiple means are considered, he points out, the number of public—federal, state, and local—and private managers is enlarged.

To provide leadership, focus public attention, and facilitate cooperative study by this increasing number of management elements, White points to the potential of the federal-state river basin commissions whose establishment was authorized by the Water Resources Planning Act of 1965. In the last three years, upon request of the states concerned and with the concurrence of the Water Resources Council, the President has established such commissions in the Pacific Northwest, the Souris-Red-Rainy region, the Great Lakes, and New England. Comprehensive framework studies are under way in these regions that aim to take into consideration long-term needs of all kinds, including the preservation of wild and scenic rivers as well as resource development, the availability of water and related land resources to meet needs, alternative patterns of resource use that might be adopted, and the alternative means of enabling such uses. More detailed coordinated studies, outlining specific alternative means of meeting needs at specific times and places, are undertaken where needed. It should be possible for every type of means to be supplied by one or more federal, state, or local agencies or by private enterprise; therefore, no means should be excluded from the possibility of utilization if it best meets public preferences.

Comprehensive framework studies, it is hoped, will go a long way in enabling public preferences within a region to manifest themselves. Subsequent more detailed, coordinated studies can then be undertaken with greater confidence than in the past that they will lead to action. With the Water Resources Research Act of 1964 and other means, research as a tool to assist management should be increasingly utilized. Two of the present commissions, the Great Lakes Basins Commission and the New England River Basins Commission, already have established channels of communication with university water research centers within their regions so as to have their inputs in planning studies. To obtain adequate participation of local government and private enterprise, however, much more needs to be done. Also the means, as presently developed, for effective public participation leave much to be desired.

"What is most lacking," White said when the book was in preparation a year or so ago, "is a widely shared sense of strategy, a strategy that recognizes multiple aims, that freely canvasses multiple means, and that places a high value on maintaining flexibility." The legal and financial means are available under the Water Resources Planning Act, fortified by the Water Research Act, to carry out White's proposed strategy. His challenge to carry it through in practice will require aggressive leadership and widespread understanding and consensus on its merit. His book will help all who may be concerned to meet his challenge.

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Astrophysical Phenomenon

Mass Loss from Stars. Proceedings of a colloquium, Trieste, Sept. 1968. MARGHERITA HACK, Ed. Springer-Verlag, New York; Reidel, Dordrecht, 1969. xii + 348 pp., illus. $19.50. Astrophysics and Space Science Library, vol. 13.

Everyone now believes that many or all stars lose mass at different stages of their lives. Though our understanding of mass loss processes is still very limited for the pre-main-sequence interval, it is clear that assorted mechanisms lead to unique or repetitive slow, fast, or explosive events for many single and double stars after the beginning of nuclear burning. This volume presents the papers and dialogue from a colloquium given over to discussion of stellar mass loss. The first four sessions were nominally devoted to observations and theories of single-star mass loss and to similar studies of close binary members. A final session dealt mostly with specific episodes in novae and in symbiotic stars.

The introductory review by the late Armin Deutsch is perhaps the finest and most complete examination of mass loss in the literature; its historical perspective and excellent bibliography should ensure its value for a long time. The contributions derived from rocket and ground-based observations of single-star mass loss are familiar, and little new ground was broken. The "theoretical" papers on this theme were clearly more provocative, as may be inferred from the contrasting contributions by Barbaro and his colleagues and Lindoff. Treating overlapping samples of galactic clusters, these two studies arrive at very different answers to the question of whether mass loss has been significant for the member red giants. It would be useful to resolve this problem if only to place in perspective several other papers on subsequent evolutionary stages at the hot side of the Hertzsprung-Russell diagram. There also emerges a consensus that solar-wind-type mass loss, no matter how small the rate, has potentially broad application.

Differential close binary evolution has clearly reached maturity. No disagreement of consequence exists among the theoreticians at this stage of understanding of their separate stylized cases, but these cases must be recognized as limiting treatments built upon systemic conservation of mass and angular momentum. The presentation then is one of mass exchange between the components. A new student of these efforts probably can find no better synthesis than in the session-4 papers of these proceedings. The observers' papers are more of a miscellany, but the summaries by Sahade and Wood can be recommended. There is no explicit treatment of how effective single-star mass loss may be at certain stages of close binary evolution.

The volume is excellently printed with very few typographical errors, but a large number of gauche renderings into English have survived the editing. It is also true that a significant number of individual contributions have appeared in journals or observatory serials before publication of these proceedings.

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