Introduction

Computer Tools for Aquaculture

This issue of Aquacultural Engineering provides a compilation of computer software applications (computer tools) that have been developed for aquaculture siting, facility design, and management planning. This collective work originated from a session on aquaculture computer tools held at the 1998 annual meeting of the World Aquaculture Society (Las Vegas, Nevada) which was co-sponsored by the Aquacultural Engineering Society and the Bioengineering Section of the American Fisheries Society. A primary emphasis of this meeting session, and in this journal issue, is the development and application of computer tools intended for practical applications, rather than purely research objectives. The papers comprising this issue provide a widely ranging sampling of current developments in aquaculture computer tools but are not meant to represent a comprehensive review. The material presented should be of interest to computer tool developers, subject matter specialists, and end users, working in aquaculture research, education, extension, policy, development, and production.

With the rapid expansion of both aquaculture production and computer technology in the last few decades, development and use of computer tools for aquaculture has shown considerable advancements. A survey of computer tools developed for aquaculture (available on the internet at http://biosys.bre.orst.edu/aquacult/aquasoft.htm) demonstrates that products are available for a wide variety of purposes, including financial analysis, development planning and project appraisal, facility design, management planning and production forecasting, facility construction, management decision support and record keeping, fish feed formulation, fish bioenergetics, disease diagnosis and treatment, environmental regulation, information systems and databases, and automated monitoring and control. These computer tools are implemented as spreadsheets, interactive databases, stand alone computer programs, decision support systems, and geographical information systems. Comprehensive coverage of this combined subject area is not possible within this journal issue but most of these areas are covered to some degree and many at considerable depth. Computer tools developed for purely research purposes (most notably computerized simulation models of aquaculture facility components and...
systems) are not included, but such basic work provides a foundation for much of the presented material. Aquaculture software for daily operations management and record keeping are also not represented in this issue.

The rationale behind the development and use of computer software tools for aquaculture is well founded. Aquaculture development planning, design, and management require expertise in a variety of disciplines, an ability to access and integrate a variety of relevant information and data sources, and a capacity to perform computationally intensive analyses. Finally, these tasks must be compiled into tabular and graphical summaries or other reporting mechanisms for application to decision making. Required analyses encountered in these tasks range from individual physical, chemical, and biological unit processes, to the combined processes that represent fish culture systems and production facilities, to regional perspectives of environmental, infrastructure, and socio-economic variables that comprise the foundation of aquaculture development and practice. To address these challenges, computer tools can embody expertise in aquaculture science and engineering, serve as access and query mechanisms for databases and information resources, and assume the major burden of data management and calculation processing. One of the critical remaining challenges is to bring these computer tools into mainstream use. This will require ongoing, cooperative efforts between tool developers, subject matter specialists, and end users, improved standardization of aquaculture research methods and reporting, and expanded access to data and information generated through aquaculture research and production.

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