NOTICE OF PUBLICATION

Title: Development of decision support tools for aquaculture: The POND experience

Author(s): John Bolte
Department of Bioresource Engineering
Oregon State University
Corvallis, OR 97331 USA

Shree Nath
Skillings–Connolly, Inc.
5016 Lacy Boulevard S.E.
Lacey, WA 95803 USA

Doug Ernst
Department of Bioresource Engineering
Oregon State University
Corvallis, OR 97331 USA

The CRSP will not be distributing this publication. Copies may be obtained by writing to the authors.

Abstract: Decision support systems (DSS) are potentially valuable tools for assessing the economic and ecological impacts of alternative decisions on aquaculture production. In this paper, we discuss the philosophy of design, functional modules and application areas of POND, a decision tool that has been developed to allow analysis of pond aquaculture facilities by the use of a combination of simulation models and enterprise budgeting. We focus less on the details of POND's internal models, and more on the experiences we have gained from going through the process of the designing, developing and using the POND software. POND was designed and implemented using object-oriented programming principles. The software makes use of a simulation framework to provide much of the generic simulation, data handling, time flow synchronization and communication features necessary for complex model-based DSSs. Additionally, an architecture suitable for representing and manipulating pond aquaculture facilities was developed in order to meet the design specifications of POND. This architecture includes a series of mini-databases, a number of knowledge-based components ('experts'), models of the pond ecosystem, and various decision support features (e.g. assembling alternate management scenarios, economic analysis, and data visualization). A typical POND simulation consists of assembling a number of appropriate

Continued...

objects or entities (e.g. multiple ponds and fish lots), their management settings together with appropriate experts (e.g. an aquaculture engineer, an aquatic biologist, an economist, etc.), and projecting changes in the facility over time. Our experience with the development of POND and other simulation-based tools indicates that the object-based approach provides a robust foundation for developing tools which allow code reusability, facilitate maintenance of complex software, and enable partition of program development among multiple programmers. Experience gained with POND users suggests that there are largely two groups of aquaculture personnel interested in such applications, namely commercial growers and educators. These two groups have substantially different interests and needs. Consequently, a single tool such as POND may not optimally meet the requirements of both groups. Recent development work on POND, and the need to involve users in the design process of such tools are discussed.