

HYDROGRAPHY — A PERSPECTIVE

by Michael BOLTON^(*)

This paper was presented at the Centennial Convention of the Canadian Institute of Surveying in Ottawa, April 1982 and has already been published in Vol. 1 of the Proceedings of this Convention. It is reproduced here with the kind permission of the Canadian Institute of Surveying in Ottawa.

ABSTRACT

In common with the other survey sciences, hydrography stands in the middle of a rapidly evolving technology. While great strides are being made in the development of sophisticated hardware and associated interfaces, can the same be said for the progress of users and interpreters of equipment and data ?

This paper discusses the evolution of the hydrographer as a professional and raises some concerns about his present and future role. It questions whether the hydrographic community is responding as readily to the development of its personnel as it is to the development of automated data acquisition and data processing systems.

In common with other professionals, the hydrographer of today is subject to some job-related pressures. There is the ongoing pressure to maintain and upgrade his scientific knowledge. Hand in hand with this is the requirement to stay abreast of the latest technological advances, more commonly known as the tools of his trade. There is pressure, in Canada at least, for him to expand his horizons, to move beyond measurement and into the management of data and submerged land. Above all there is the constant pressure to succeed in his chosen profession.

We are all concerned with the fear of technological obsolescence. A quick perusal of various scientific journals reveals the breadth and depth of subject matter covered. Similarly, most scientific conferences and seminars cover in depth the technological changes — I hesitate to use the word advances — that permeate our professional world.

(*) Canadian Hydrographic Service, Institute of Ocean Sciences, P.O. Box 6000, Sidney, British Columbia V8L 4B2, Canada.

Hydrography, as a specialized branch of surveying, is not immune from concern for technological change. A review of recent issues of three journals dedicated to hydrography reveals that an ever increasing amount of the printed page, at least those parts not dedicated to the advertiser, is devoted to the mystery and mastery of the 'black box', the present day tools of the profession, or to the introduction of yet another, more sophisticated 'black box'. Indeed the advertising pages are also dedicated to expounding the merits and potential achievements of new or improved hardware.

The journals I refer to are (1) *International Hydrographic Review*, published by the International Hydrographic Organization, Monaco; (2) *Hydrographic Journal*, published by the Hydrographic Society, London, and (3) *Lighthouse*, published by the Canadian Hydrographers' Association, Halifax.

Recent national and international hydrographic conferences have highlighted topics of similar interest. The emphasis on new equipment and new techniques is understandable and, in many ways, essential as this fear of technological obsolescence stalks relentlessly with every professional worthy of the name. Without question, one of the primary aims of every professional organization is continuing education for its members, and this continuing education often revolves around technological advances.

In the last two or three years, surveyors in this country have been urged to expand their profession. The surveyor is being told he should not only measure but should also manage the information he obtains from these measurements. He is also being urged to broaden his sights and that it is not good enough for him to be only a cadastral surveyor or just a hydrographic surveyor. If he knows what is good for him he had better apply himself and achieve a good working knowledge of the other disciplines that fall under the wide umbrella of the surveying profession.

The recent introduction of the Canada Lands Surveys Act would appear to reinforce this requirement for broader based surveying knowledge. Candidates applying for a commission as a Canada Lands Surveyor are required to sit examinations on specific survey disciplines such as hydrography, geodesy, photogrammetry, remote sensing and cartography. In order to be successful, much more than a superficial knowledge of each subject is required as the examinations are rigorous and detailed.

Additionally, today's surveyor is being asked to modernize his profession. At present the thrust is towards the land surveyor as he is urged to assume a leading role in the closely related areas of land information and land management. No doubt in the near future attention will focus on the hydrographic surveyor and he too will be encouraged to enter the arena of ocean information and ocean floor management.

It is certainly not my purpose, nor the purpose of this paper, to approve or rebut this call for an expanded profession. I can only point out that these new endeavours will bring not only challenge but additional pressures to the already burdened surveyor.

The hydrographer is not immune to the requirement to survive in the real world. The normal human instinct to compete successfully exerts an ongoing pressure on practitioners in both the public and private sectors of hydrography.

The rewards, be they in the form of prestige, promotion or profit, generally accrue to those who are the most proficient in the practice of their profession. This desire to achieve, to improve and to progress leads the hydrographer to seek continuing education and search for the new and improved technology referred to earlier.

In recent years, what has been the end product of these pressures and these new thrusts in education and expansion? I suggest that the results have been the development of highly educated technologists who feel comfortable working with computers and associated software, digitizers, EDMs (electronic distance measuring equipment) and all the highly sophisticated 'black boxes' created to provide positional and depth information. The end product of the 'black box' is usually a magnetic tape with positional and depth information neatly packaged and merged.

Similar things are happening to the marine cartographer. Digitizing tables, mini-computers and automated plotting and drawing tables are now the modern tools of his trade. He is being asked to digitize, to manipulate, to compile interactively and thence to produce an automatically drawn chart. Some of us are concerned that in the process of learning to handle these modern systems he may have lost the basic feel for the data and what they actually represent.

I wonder if the current educational, training and practices of hydrography are producing well balanced hydrographers and marine cartographers. I also wonder if our giant steps in research and automation are really necessary. Is the result more efficient hydrography or are we automating only for the sake of automation? For years I have harboured reservations about some of the automated processes, not only because the proponents of such systems have never been able to convincingly demonstrate their cost effectiveness but also because I believe automated systems tend to leave the hydrographer quite remote from his environment and hence from his hydrography.

The editorial in a recent issue of the *Canadian Surveyor* alludes to this problem. The author expresses concern for "the Forgotten Surveyor" and the fact that too much emphasis is placed on research and abstract concepts, while far too little is placed on the basics of the profession. His claim that traditional surveying is being largely ignored has equal application to traditional hydrography and traditional hydrographers.

Unfortunately, I can see no simple solution to this perceived problem. In a commendable effort to achieve standardization of backgrounds for hydrographic surveyors, the 'Fédération Internationale des Géomètres' (FIG) and the International Hydrographic Organization (IHO) established a working group charged with developing standards of competence and education in hydrographic surveying. This diligent group has produced a detailed syllabus outlining the educational requirements for Category A and Category B hydrographers. Category A relates to a professional level of hydrographer while Category B would be equivalent to a hydrographic technologist.

These syllabi, approved by both sponsoring organizations, have received general acceptance in the international hydrographic community. However, while they do address and emphasize the educational requirements for hydrographers, they are surprisingly mute on the subject of competence. The Standards discuss 'practical knowledge' of a subject such as Nautical Science with the implication that the principles are known, along with the ability to apply them in a practical

situation. How a candidate achieves this ability to apply the principles in a practical situation is not discussed, other than to recommend that two years field experience should be required. Experience is not defined.

Implicit in these Standards of Competence and, indeed, in any discussion of hydrographic education, is the need for 'hands-on' training and experience. In this regard, experience with the various 'black boxes' is not good enough. It requires little experience and less knowledge to become proficient in turning a switch on and off or in ascertaining when an instrument is functioning correctly.

One possible answer may lie in the introduction (or re-introduction) of a formalized apprentice system for hydrographic recruits. This may guarantee that aspiring hydrographers are exposed to practical 'hands-on' experience in basic hydrography under the direct supervision and tuition of an experienced hydrographer. It remains essential that those practising the profession of hydrography have and retain an intimate feeling for their marine environment.

I can only echo and endorse the statement of Steve RITCHIE, President (*) of the International Hydrographic Bureau, that the hydrographer's role is "to collect completely reliable field data for the compilation of a nautical chart and the closely associated sailing directions". The collection of positional and depth information only fulfills part of this role.

I seriously question whether the training and educational programs offered today in hydrography are equipping new entrants with all the skills and knowledge they need. The collection and collation of complete field data requires an awareness of and a sensitivity to the marine environment which appear to be under-emphasized in the training and educational programs being offered today.

By all means, let us strive for the highest educational levels possible for those entering our profession, but not at the expense of the basic requirements. It serves little purpose to be knowledgeable about differential geometry if a shoal remains undetected because the hydrographer ignored or was unaware of the significance of a breaking wave or a change in water colouration.

Let us not lose sight of the forest because of the trees.

REFERENCES

- Dept. of Energy, Mines and Resources (1979) : Regulations and information for candidates for Canada Lands Surveyors, 20th Ed.
- FIG/IHO (1981) : Standards of Competence for hydrographic surveyors, 2nd Ed., June. International Hydrographic Bureau.
- MATTHEWS, J. & RAYMOND, G. (1981) : The expanded survey profession, *The Canadian Surveyor*, Vol. 35, No. 3, September.
- RITCHIE, G.S. (1981) : Hydrography, yesterday, today and tomorrow. Proceedings of the 20th Annual Canadian Hydrographic Conference, Burlington, April. Also in : *Intern. Hydrog. Review*, LIX (2), July 1982.

(*) Editor's note : Up to September 1982.

- WEIR, C.H. (1981) : The surveyor — A member of the land management team. *The Canadian Surveyor*, Vol. 35, No. 3, September.
- WELLS, D.E. (1981) : Mathematics and computing syllabi for hydrographers in Canada. *Lighthouse*, No. 24, November.
- WOOLNOUGH, D. (1981) : The forgotten surveyor. *The Canadian Surveyor*, Vol. 35, No. 4, December.