Editorial—The peer-review system: prospects and challenges

INTRODUCTION

The peer-review system, to which manuscripts submitted to academic journals are exposed, has a long history going back to at least 1752. The system is of general concern, since most scientists have reviewed papers by others and have been exposed to reviews of their own papers, some of which were fair, useful and constructive, while others less so.

At times, individuals are not happy with the existing review system, especially when papers are rejected. Undoubtedly, rejection is a healthy feature of the system. The Editor of *Hydrological Sciences Journal* (*HSJ*) has to reject many incoming manuscripts (at a rate comparable with similar hydrological journals). No one likes having her/his paper rejected, but a fair and constructive review backing the decision renders the situation understandable and acceptable. However, occasionally authors are disappointed by features of the review process (e.g. excessive delays, unsupported negative statements).

Our aim is to take a look at the anatomy of the review process, its mechanisms and options, including the novel Internet track. We wish to appraise readers of the reviewing practices, regarding *HSJ* in a broader perspective of other journals. We discuss experiments with the peer-review system, which are little (if at all) known to the broad hydrological community, and are likely to be of considerable interest to *HSJ* readers. Being aware of problems with the existing system, we seek a way of improving it, concluding that evolution rather than revolution is necessary. In brief, efforts should be made to reduce the occurrence of pitfalls in the existing system.

Being *HSJ* Editor (ZWK) and an Associate Editor (DK), and having gathered considerable experience in academic publishing (writing, reviewing and editing) in the water field, we predominantly discuss experiences from water-related journals, and *HSJ* in particular, although we make reference first to general investigations of the peer-review system. We hope that this editorial article, and the discussion it may generate, may assist the referees and authors of *HSJ* papers and lead to an improvement in the editorial procedures and eventually in the quality and impact of *HSJ*, the oldest hydrological periodical celebrating the publication of its 50th volume in 2005.

REVIEW SYSTEMS REVISITED

The general objective of the review system is to help answer the following question: is the object under review (submitted manuscript, project proposal, etc.) good enough (for publication or funding) relative to other candidates and/or to a pre-defined (possibly fuzzy) threshold? The normative statement of the task of reviewing a manuscript submitted to a journal for possible publication is that of comparison to a (varying) set of standards (e.g. to other papers in the same journal, or in other journals).

Wesolowski (2003) stated that the review process should ensure, among other things, that the material is new (or a useful summary of previous work), that data and conclusions are correct or at least believable, that the subject matter and impact are appropriate for a given journal, and that the presentation is readable. As Beck (2003) puts it, a system of reviewing should filter out junk science and provide useful feedback to authors of non-junk science who have submitted work that can be improved. This filtering, however, should be careful enough to allow unorthodox but possibly correct, innovative ideas to get through. Reviewers have a duty to help the authors, help the advancement of the science, and help the journals publish useful papers (Robinove, 2003).

The stakeholders in the review process: authors, reviewers, editors, readers and publishers, have different points of view. The review process may occasionally lead to disappointing results in the perception of one or more stakeholders. Can these perspectives be reconciled?

Editors are primarily responsible for the quality of journals. Typically, an editor wishes to avoid, as far as possible, making editorial "errors of the first kind" (publishing papers that do not deserve publication) and "errors of the second kind" (rejecting papers that deserve publication) (cf. Kundzewicz, 2002). What is needed, therefore, is vision to imagine how the paper may look after revision. It may be easy to state that the paper is poor now, but it is much more difficult to anticipate its shape after the process of revision. A pool of competent referees is necessary to aid editors in making informed, rational and impartial decisions on acceptance/rejection of a submitted manuscript, for the benefit of the journal quality. The Editor's role includes initiating and monitoring the review process, considering possible nemesis between authors and referees. Editors can accelerate the review process by reminding referees about the task they had agreed to do.

Authors wish to see their papers accepted and published (and having impact). They expect useful reviews, being genuinely interested in improving their papers. At times, authors may feel that their papers are not publishable yet, but they submit manuscripts in order to get them peer reviewed, seeking constructive comments.

Referees (reviewers) are delivering a community service. Indeed, reviewing journal papers is probably the least (directly) profitable scientific activity. Reviewing books could be more rewarding—while a book review in itself is a tiny publication, the (possibly expensive) copy of the book under review remains the property of the reviewer. Referees' attitudes can be summarized as follows: if a fine paper is in the very area of the reviewer's interest and expertise, she/he may be gladly willing to review. Excellent papers may be an interesting, and scientifically enriching read, which potentially informs the referee about the newest research results. At the other extreme are poor papers—not worthy of being communicated. Reviewing such papers may be regarded as a waste of time. Also, poor language and presentation may be a problem. In some cases, it may indeed take quite a long time for a referee to decipher what the author wanted to say, so it is not easy to assess whether a paper contains valuable elements or not.

Readers wish to find interesting material in a journal. They appreciate it if papers

are well written, clearly and logically presented, and easy to understand. Hence, the reader's expectation is one of critical reviews, that eliminate poor papers.

Publishers (scholarly societies, private enterprises, or combinations of the two) are responsible for the general operational framework of a journal, the appointment of editors and the decision and implementation of policies related to journal quality, dissemination, economic health and long-term sustainability.

There may be conflicts of interest among the different stakeholders. Armstrong (1982) proposed a controversial "authors' formula"—a set of rules, which can be used by authors to increase the likelihood and speed of acceptance of their papers in the existing peer-review system. According to Armstrong's hypothesis, authors improve the chances of acceptance if they do **not** (i) pick an important problem; (ii) challenge existing beliefs; (iii) obtain surprising results; (iv) use simple methods; (v) provide full disclosure; (vi) write clearly. The formula demonstrates a possible conflict of interest between authors on the one hand, and editors, referees and readers on the other. Readers wish to see papers fulfilling exactly the opposite conditions to the authors' formula.

At the same time, readers generally trust papers that have passed the quality control offered by the peer-review system much more than they do unreviewed papers. Thus, the no-review publishing option, in which the editor makes an evaluation and decides upon acceptance or rejection of the submitted manuscript without any advice from reviewers, has not become widespread. Even if this option is fast and uniform, based on one person's view, it has grave disadvantages, such as superficiality, subjectivity, bias and incompetence. Journals publishing papers without peer review are considered as inferior to the reviewed ones and do not count in several evaluation systems. However, such journals may be of some merit, e.g. to disseminate unorthodox ideas that are difficult to publish in established journals. Today this option is more directly offered by the Internet, where any scientist can make unreviewed publications publicly available.

There are three basic peer review options, which are summarized with their main advantages and disadvantages in Table 1, and discussed below. Some journals may operate on a mixed system with more than one of these basic options simultaneously. Traditionally, in all options, the review process is confidential, but recently the alternative of full publicity of reviews has been also experimented (see next section). Thus, possible combinations of these options and alternatives may form a variety of peer-review systems.

Half-blind review

The dominant option in academic publishing is the half-blind (half-anonymous) mode, where names of referees are unknown to authors, but names of authors are known to referees, so the system is asymmetric, by construction. Another asymmetry lies in the perspective of the parties, since authors are working for their career, while referees are doing unaccounted (due to anonymity) and unpaid community service. However, the system has proved to be workable and manageable, despite some problems, which can be divided into the following categories: subjectivity, bias, abuse, nondetection of defects, fraud and misconduct (Williamson, 2002; see also Table 2). The categories are general, yet the severity of each of these problem areas may differ for various sciences.

Table 1 Basic options of peer review (based on many sources contained in the list of references and our interpretations).

Option	Main advantages	Main disadvantages
Half-blind review (dominant system)	Workable; satisfactory to most stakeholders.	Allows subjectivity, bias, abuse; affords the referees the possibility to be rude, vindictive and lazy.
Open review	Transparency; equity; accountability of referees' work.	Reluctance of referees to follow; probably positively biased for established authorities.
Blind review	Equity.	Costly and difficult to implement, or even infeasible.

Table 2 Potential problems in the peer-review system (idea from Williamson, 2002, with our interpretation).

Category	Culprit	Specification	Solution/remarks
Subjectivity	Editor	Rejecting a potentially fine (though possibly inadequate at the moment) paper outright, without sending it to a referee.	The option "reject outright, without review" should refer to absolutely clear cases only. Otherwise, advice of other experts should be sought.
		Choice of a referee to achieve a desired decision (a referee with a reputation of being particularly "harsh" or "gentle").	Using a standard checklist. Collective decision making.
Bias	Referee Editor Publisher	Underestimation of papers by less well-known authors, from less well-known institutions, discrimination against author's age, nationality, ideology, gender, race.	Using a standard checklist. Eponymous (open) reviewing or fully anonymous (blind) reviewing.
Abuse	Author	Multiple submissions of very similar papers to different journals ("salami" publishing). Downgrading junior co-authors, or inclusion of co-authors that did not contribute meaningfully to the paper.	Referees and/or editor should try hard to detect such cases. The Internet helps detection (see next section).
	Referee	Abuse of access to privileged information. "Stealing" ideas or results from material under review. This may happen in any peer-review system except in open review.	It is very difficult to prevent this except by making the procedure public (see next section). Probably rare in hydrological sciences, though.
		Delaying the process and ultimate publication (for any reason, e.g. being lazy, or in order to promote his/her own contribution).	The editor should intervene and remind tardy referees.
Nondetection of defects	Referee	Nondetection of errors of facts, wrong methodology, results, corollaries.	Vigilance of editors and referees; multiple reviews.
Fraud and misconduct	Author	Fabrication of results, false data, or claiming authorship of results which they know not to be their own.	Referees should detect fraud and misconduct. The Internet discourages it.

Abuse, fraud and misconduct by authors are driven by the "publish or perish" syndrome (for a critique of this problem and proposals of solutions, see e.g. Gad-el-Hak, 2004 and Lock, 1994). "Salami" publishing by authors should be distinguished from second-hand submissions, that is re-submitting papers which were rejected in other journals. Most frequently, this practice (see Table 2) helps the publication of low-quality papers and is a negative symptom. It is difficult to spot such papers unless they meet the same reviewers in different journals. However, it is a healthy practice if a good paper, rejected in consequence of the pathologies listed in Table 2, is resubmitted to another journal.

Referees are expected to detect multiple submissions, defects, fraud and misconduct (e.g. plagiarism). However, the efficiency of detection in the peer-review

system may not be high (cf. Peters & Ceci, 1982). Hence, permanent vigilance by editors and referees is needed. Subjectivity, bias, and failure to detect errors can be minimized by training reviewers and using standard checklists. Unethical reviews (abuse) should be punished.

Peters & Ceci (1982) tested the peer-review process, resubmitting 12 psychology articles (published earlier by authors from prestigious and highly productive departments) to journals including those that originally published them. In this experiment, fictitious names and institutions of authors were used, but no change was made to the contents. The results were as follows: three re-submissions were detected as such; of the other nine, eight were rejected. These rejections were interpreted as systematic bias against unknown authors and institutions.

Negative experiences of the prevalent peer-review system have been reported by many. For example, Savov (2003) and Criss & Hofmeister (2003) mention the rejection scenario in which a constructive review requesting minor revision did not suffice to counterbalance an anonymous hostile "copy and paste review" that could have been written about any manuscript on any topic by any author. The present system does not give authors an opportunity to rebut incorrect and overly negative statements made by referees (see Genereux & Sen, 2004). If referees' names were known, misconduct in peer review might be much less frequent.

Open review

Open review (where all names are known to all parties) is being introduced in some journals, and considered in others (this is also known as *signed review*, mandatory reviewer identification and more concisely, *eponymous*, as opposed to anonymous review). The rationale is: "Let's do away with anonymous reviews and take both the credit and the blame for our ideas" (Robinove, 2003).

Indeed, this system is advantageous for the transparency and equity of the review process and it avoids some of the problems of the half-blind system (e.g. abuse, cf. Table 2; see also Santos-Sacchi, 2002). Godlee (2002) lists four key arguments in favour of open review: (a) ethical superiority, (b) lack of important adverse effects, (c) feasibility in practice, and (d) potential to balance greater accountability for reviewers with credit for the work they do. She also argues that barriers to more widespread use of open review include conservatism within the research community and the fact that openness makes editors publicly responsible for their choice of reviewers and their interpretation of reviewers' comments.

The disadvantage is that many experts are reluctant to review papers in the open review system. Wesolowski (2003) noted that it is already hard to find enough qualified reviewers willing to do the job without threatening them with exposure as well. Offering anonymity to referees is a condition of the smooth operation of journals. If papers are to be published within a reasonable timeframe, anonymous refereeing should be tolerated. Reasons leading reviewers to wish to be anonymous, were summarized by Beck (2003) as follows:

- You need to write something negative about a manuscript produced by somebody in power over you;
- You get a paper by a bitter scientific rival and hope to get away with it;
- You have agreed to do a review, then find no time or are uninterested in the topic;

eventually, you do a superficial, inadequate job, hidden behind anonymous status to protect your reputation;

– A friend and/or respected colleague has submitted a paper that in your judgment is wrong and should be rejected.

Beck suggests that within an open review system, in all these cases there is a much better solution: refuse to do the review, or, if you initially accepted to do it, apologize to the editor and send the manuscript back. Dolan (2002) quantified reviewers' unwillingness to sign their reviews for the journal *Aquatic Microbial Ecology*: only 8% prefer signing their reviews, whereas 54% prefer not signing. (Interestingly, 28% of the same people, when authors, prefer receiving signed reviews, while 26% prefer unsigned ones—an ethical paradox?) Due to this serious obstacle, many journals are operating in a mixed mode, where only some referees agree to disclose their names. Criss & Hofmeister (2003) state that, in the mixed system, signing a (critical) review places the referee at a disadvantage in a competitive, increasingly secretive environment. There are people who feel that anyone criticizing their work is not worthy of respect, tenure, funded grants, etc. No one is "safe", as retaliation can be directed toward anyone who has authored (or is imagined to have authored) a critical review.

Blind review

According to Rennie (1994), completely blind review (with no one but an editorial assistant knowing the identity of the authors and only the editor knowing the identity of the reviewer) along with completely open review are the only two ethically justifiable systems of peer review. The rationale for the blind review is: "I do not want people to think about who I am. I want them to think about what I write" (Forel, 2003).

The blind review system is believed to fix problems of prejudice and discrimination. However, this system has disadvantages too. It is costly and difficult, and technically cumbersome. Removal of the few lines related to author's identity from the first page is not sufficient. Authorship may be guessed by a knowledgeable reader from context. Hence, submitted manuscripts should have no hidden "signatures", which in some cases may be impossible (e.g. in a paper that continues already published work). Speculations on the identification of authors, on their name and/or institution (e.g. based on particular statements, references, self-references) may be commonplace, as are speculations about referees' identities in the half-blind system. In a randomized controlled trial related to the *British Medical Journal* (*BMJ*), reviewers who were not told the identity of authors correctly identified the authors in 42% of cases (van Rooyen *et al*., 1998). Obviously, the frequency of authors correctly identifying reviewers is much lower (6% in a study by Wessely *et al*., 1996).

Effect of the review option on the quality of peer review

Godlee *et al.* (1998) evaluated the effect of the three review options described above on the quality of peer review for a medical journal (again *BMJ*). A paper already peer reviewed and accepted for publication was altered to introduce eight deliberate weaknesses in design, analysis, or interpretation. The altered paper was sent to reviewers randomly allocated to groups implementing several combinations of hiding authors' and reviewers' identities. The results showed no statistically significant differences between

groups in their performance, except for the fact that reviewers who were blind to authors' identities were less likely to recommend rejection than those aware of the authors' identities. The mean number of weaknesses spotted was only 2. Only 10% of reviewers identified half or more areas of the weaknesses, and 16% failed to identify any. Despite the weaknesses of the manuscript, 33% of reviewers recommended publication with minor revision, 12% recommended major revision, 30% advised rejection and 25% made no recommendations.

The low performance in spotting the errors in this experiment might also be interpreted as showing that peer review "does not work" (Smith, 1997). In the authors' opinion this interpretation is rather exaggerated. After all, the duty of reviewers is not to detect all errors in a manuscript and correct them. Authors remain responsible for any errors or weaknesses in their paper. Furthermore, the experiment clearly indicates that the argument for open review is not related to the quality of peer review but it is ultimately ethical—it puts authors and reviewers in equal positions and increases accountability (Smith, 1997). Other experiments indicate somewhat diverging results. For example, the experiment by van Rooyen *et al.* (1998) revealed no difference in review quality between blinded and unblinded reviewers, whereas Walsh *et al.* (2000) concluded that signed reviews are of higher quality, more courteous and take longer to complete than unsigned reviews.

THE INTERNET—NEW OPPORTUNITIES

The Internet has fundamentally changed the process of distributing scientific information, offering the chance of global and interactive representation and dissemination of human knowledge (Berlin Declaration, 2003). New electronic opportunities for scientific communication, and changes in how scientists use journals, are prompting a complete re-evaluation of the roles of scientific journals and of scholarly societies (Langer, 2000).

The utility of the Internet in electronic dissemination of information and electronic publishing of scientific journals was understood at an early phase of the development of the World Wide Web (WWW). Today, most scientific journals have adapted to some of the options offered by the Internet technologies: (a) easy publication of information of any kind by any user, (b) direct accessibility of any user to this information, and (c) extremely convenient and fast location of information via search engines.

The Internet enables everyone to publish information (data, research results, lecture notes, opinions, etc.) at virtually no cost and no restriction of accessibility. Thus, the no-review publication system (mentioned above), traditionally offered by some journals, is now openly available to any user of the Internet. In this case, the dissemination part of the publisher's role is automatically undertaken by search engines, such as Google, so if the document published is cleverly designed, it will reach many potential users that seek the specific information using relevant keywords. Obviously, this kind of information has not passed any quality control and it is the user's responsibility to decide whether an article "fished" on the web is of adequate quality or not. However, the importance of information of this type should not be underestimated. Most references used to synthesize this article were located on the web and some of them are unreviewed articles. In some communities (e.g. theoretical physics), this importance may be even greater, as expressed by Langer (2000): "For research purposes, they don't need refereed print journals at all. They are producing

remarkable results this way, so I take them very seriously. What they are doing is using the Los Alamos e-print archive for all of their research communications. They check it every day for new information. They post all their papers there, cite references by archive number, use the search engine to find other papers, and need little or no other publication services. Publication on the archive is instantaneous. It costs the users nothing and is self-organizing—or at least it appears so. It's also far more democratic than the old system with which I grew up. Physicists all over the world can post their research results without being hassled by grumpy editors and referees."

We view this function of the Internet not as a threat to journals but as a complementary synergistic function towards scientific progress. The quality control (and improvement) offered by journals through the peer-review system along with the accountability (crediting) of authors will continue to be central issues in the academic community. However, the role of journals in terms of publishing and disseminating information should be reconsidered in light of the Internet-determined reality. Traditionally, print journals were the only method for dissemination of research results and their subscribers paid to have access to the information published. This has now dramatically changed and the whole system is put into a paradoxical situation: if you publish your work on your own web site (or on organized web archives allowing posting of articles), anyone can access it, whereas if you publish it through a journal, access is restricted to subscribers and your right to publish your work independently is revoked by the copyright transfer. As a result, journals actually put restrictions on the dissemination of knowledge, thus contradicting their primary purpose. The large publishing companies have responded to this paradox by making central agreements with universities and research organizations and/or networks thereof, by which they provide massive access to all their journals in a manner that makes the recipients feel that they have unrestricted access to information.

Another option is described in the *Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities* (Berlin Declaration, 2003). The Declaration states that authors and right holders should grant to all users a free, irrevocable, and universal right of access to their contributions and allow their work to be used, reproduced, or disseminated in digital form (provided correct attribution of authorship or copyright owner is given). As democratic and appealing as the Declaration may sound, when applied to journals it implies that the cost of the entire system should be paid by authors, whereas in other options it is paid, directly (by individual subscription) or indirectly (through organizational arrangements) by the user of the information. One may argue that this cost is a small percentage of the total cost of the research producing the publication, and its incorporation to the total research cost will not have significant effects. However, in developing countries, the authors may not be able to afford to pay such service charges. There has been much discussion of this (e.g. Gardner *et al*., 2003) and options such as subsidy of authors' costs may be possible.

The Internet also offers a major service to the authoring process (for cooperation of co-authors as e.g. in this article) and editorial tasks including the review process, which results in savings of time and money in comparison to traditional practices. Now many journals use an electronic submission, review and tracking system, more or less automatic, based on WWW software applications, e-mails, or a combination of the two. Electronic systems reduce time (e.g. for search of referees, submitting and communicating manuscripts and reviews among authors, reviewers, editors and publishers) and money (for copying, posting, tracking, etc.).

Another utility of the Internet relates to the more ethical aspects of scientific publishing. The detection of plagiarism is greatly facilitated, as search engines can easily locate multiple appearances of a certain phrase. This concerns not only present and future publications, that will be available on-line, but also past publications, as more journals put their backfiles on-line, extending in some cases more than a hundred years ago. This should discourage plagiarism. Also, stealing ideas or results from material under review is automatically "disabled" if the review process is made public on the Internet. Finally, the Internet offers the option of accountability (crediting) of all participants in the evaluation process, provided that all the contributions are eponymous. If a review is done eponymously in an open Internet environment, then it could be regarded as a tiny publication and credit given to its author.

In several disciplines (e.g. physics and mathematics) adaptations to web-based opportunities and especially to open access procedures is already commonplace. In the discipline of hydrology and water resources, the journal that has mostly adapted all procedures to the web is *Hydrology and Earth System Sciences* (*HESS*), published as an open access journal (in accordance with the Berlin Declaration, 2003). All papers published by *HESS* are copyrighted by the authors and licensed under the Creative Commons Attribution–NonCommercial–ShareAlike Licence. This license allows anyone to copy and distribute the work and to make derivative works, as long as one gives the original author credit, does not use this work for commercial purposes and, if altering, transforming, or building upon this work, one distributes the resulting work under a license identical to the original. Thus, there are no copyright-related limitations to the dissemination of the works published, and the electronic access to any paper is open and free of charge. This surely enhances the dissemination of works, which is good for the authors. On the other hand the authors have to pay for the publication services.

Another innovative aspect of *HESS* is the public review procedure of each paper. A companion electronic journal, *Hydrology and Earth System Sciences Discussion* (*HESSD*) has been created, which supports the review process. Upon submission of a manuscript to *HESS* and pre-evaluation by the editor, the manuscript is published electronically in *HESSD* as a discussion paper. Upon completion of the evaluation process and possibly revision, an approved paper will be published in *HESS*, whereas non-accepted papers remain in *HESSD*; note that charging of authors is done at the first (*HESSD*) stage (effective from June 2005). The peer-review process is open and interactive within the *HESSD* electronic environment. Referees assigned by the journal submit their reviews, which can be either anonymous or eponymous, electronically. As the article is accessible to everyone, short (eponymous) comments by any interested party are allowed by the system. All contributions (comments and replies) by authors, referees, editors and audience are published electronically alongside the discussion paper and are publicly available.

Certainly this system signifies progress towards a situation in which all contributions in the research and publication process are acknowledged and credited. In particular, it has the potential to give more recognition to the work of editors and reviewers, which is greatly needed (Riisgård, 2000) and may direct the whole situation from the philosophy "publish or perish" to that of "contribute or perish", which is regarded to be healthier (Kneib, 2002). This, however, presupposes that the comments are made eponymously, which in *HESS* is not mandatory. The fact that the journal publishes anonymous reviews on the WWW as contributions alongside eponymous comments and authors' replies may

be criticised on ethical grounds for treating different participants of the process disparately: the authors' mistakes are public, whereas anonymous reviewers' mistakes are not. Co-existence of anonymity and publicity, which are totally diverging concepts, creates a paradoxical situation.

Although it is too early to make conclusions (the system of *HESS* started in November 2004), one can report on interim results. In 17 articles with at least one review, which appeared in *HESSD* at the time this article was written, there were 35 reviews or comments (not including the authors' replies and the editors' decisions) out of which 57% were anonymous and 43% eponymous, with only one unsolicited comment by a scientist not involved in the official review process. This may indicate an unwillingness of researchers to deal with articles that have not passed quality control yet. Eponymous reviews are still the minority, though their number is greater than in other hydrological journals. Certainly the hydrological community looks forward to an assessment by *HESS* of this courageous step towards the Open Access paradigm.

THE *HYDROLOGICAL SCIENCES JOURNAL (HSJ)* EXPERIENCE

Multi-criteria setting

The International Association of Hydrological Sciences needs its journal, *HSJ*, to be successful in both scientific and financial terms. These terms are not independent, as scientific success (quality of papers) is a necessary condition of financial success (or survival) of a scientific journal. The latter is difficult to achieve in the present situation of shrinking funds, subscription cuts in libraries and the advent of several new hydrological journals. The sound quality of *HSJ* (e.g. as measured by the impact factor) should be enhanced and articles likely to attract citations are welcome.

Beyond promoting scientific excellence in the cutting-edge sense, the mandate of the Association includes enhancing research in the developing world. The *HSJ* plays an important role in assisting hydrologists from less developed countries, involving them as readers, authors and referees. However, this mandate should be fulfilled while maintaining the high quality of accepted papers. It is a strategy issue, whether less stringent criteria should be applied to promote contributions from developing countries, from young hydrologists, etc.

It is difficult to reconcile partially conflicting objectives: scientific quality *versus* geographical distribution; providing adequate service to all IAHS Commissions (covering a broad range of topics, with consequences for the review process); and accommodating bilingual contributions (English and French).

The *HSJ* has one Editor, assisted by 30 Associate Editors (AEs), whose remit is to support the Journal by regular reviewing (up to five papers a year), publishing good papers themselves and offering advice. Reviews help the Editor make decisions in a multi-objective task to (a) improve the scientific level, (b) provide support to developing countries, and (c) ensure that the income is sufficient.

The review system in *HSJ*

The general standard in *HSJ* is the half-blind review system. If the Editor decides that a paper should not be rejected outright, then it goes to two (or more) reviewers. The

Editor proposes a list of potential referees and the Production Editor examines their availability and finds two experts who agree to review. Sometimes authors propose a list of reviewers (friends?) and—in rare cases—of unwelcome referees (enemies?) and their request may be heeded.

The 30 AEs are particularly relied upon to provide competent and timely reviews of papers. Some papers are indeed reviewed by two AEs, some by one AE and one non-AE, others (frequently) by two specialists from beyond the board of AEs. A rich choice is good, on the grounds of competence, reliability and speed, but at the same time it provides a broader range of subjective value scales and thresholds for recommending acceptance.

Not all manuscripts submitted to *HSJ* undergo peer review. The first hurdle is the Editor's decision whether the paper should be rejected outright, e.g. being out of the Journal's scope, or of inadequate quality. By forwarding a very poor paper to an external referee (i.e. beyond the more tolerant AEs), the Editor risks annoying this reviewer, who may not be willing to assist in future. Unintelligible, or very poor language can be a problem. However, Wesolowski (2003) criticized rejecting manuscripts out of hand because of poor spelling and grammar or poor quality of artwork. Some scientists, particularly in less developed countries, do not master the English (or French) language and/or lack the resources taken for granted in developed countries. This concern is a valid one in IAHS. Other reasons for a possible outright rejection of a paper include cases of the material being of parochial, local, or regional scope, rather than of international interest, or when it re-discovers the wheel, repeats well-known facts, etc. Only a small proportion of submissions has been rejected outright by the *HSJ* Editor, but it may grow to reflect the sentiments expressed recently by *HSJ* Associate Editors. In cases of uncertainty, the Editor will seek the advice of AEs and other experts.

Among the factors taken into account when reviewing a paper are: correctness of material, importance of findings, originality (spotting plagiarism and multiple submissions), novel methodology (only if successfully applied or a scientific breakthrough achieved, not for the sake of novelty), enhancing understanding, and factual information on the hydrology of a particular region. Attractiveness of the topical area is also important.

There are cases when two referees provide differing verdicts. Then, the paper can be sent to a third one, or the Editor may effectively act as a third, adjudicating referee. In the *HSJ* system, a referee receives copies of the other review(s) and Editor's letter to the author(s). Note, in this case a referee's name is sometimes made known to the other(s).

In the very rare case, referees state that a paper is excellent and recommend acceptance as it stands. Otherwise, it is necessary to decide whether the paper augurs well for the future, i.e. whether a revised (upgraded) draft can be accepted. Often referees recommend a re-review of the revised draft, but sometimes they declare themselves unavailable or unwilling to carry out the re-review. This may lead to problems due to lack of continuity between the review and the re-review. Quite often, referees recommend outright rejection.

In order to illustrate the review system in *HSJ*, a sample of 100 manuscripts was analysed. The results are presented in Box 1.

A review conveying the statement "Hopeless paper! Reject!" without decent justification is not exactly what is expected. It would be excellent to have more mentors who could help authors, particularly those from developing countries, explaining how the paper can be improved and rendered closer to the acceptance level.

Box 1 Illustration of performance of the review system in *HSJ*.

Sample size: 100 manuscripts/papers (nos 2201–2300) submitted for possible publication over approx. 8 months (October 2003–June 2004).

Four papers were not subject to peer review (out of scope or withdrawn). All the 96 remaining papers were subject to peer review and forwarded to two (in some cases three) referees each. Referees evaluated these 96 papers as follows: poor to fair – 126 reviews; good – 70 reviews; very good to excellent – 7 reviews.

The present state of processing of these 96 manuscripts (as of 15 June 2005) is as follows: all 34 papers accepted for publication have been published already, three papers are nearly acceptable (likely to be accepted after receipt of the final draft) and 29 have been rejected. The remaining 30 papers are still pending. Typically referees, in the first place, recommended revision and re-review, and the revised manuscripts have been subject to a re-review. In several cases, a need for another revision and a re-re-review was indicated, while, in extreme cases, multiple iterations were found necessary. Some of these papers may finally be rejected, if improvements are not satisfactory.

In many cases, reviews of the same paper, provided by different referees, are in agreement. For 10 papers, both referees dealing with a given paper recommended acceptance as it stands, or after minor revisions. For another 10 papers, both referees recommended rejection. In 27 cases, reviewers were in agreement, recommending the action: "possibly accept after major revision and re-review". In 68 cases, all referees who dealt with a given paper placed it in the same category, i. e. (i) poor to fair, or (ii) good, or (iii) very good to excellent. However, there are examples of strongly conflicting opinions, e.g. in four cases the differences are of the type: "good / accept after minor revisions" *vs* "poor to fair / reject", or "very good to excellent / accept as it stands" *vs* "poor to fair / major revision and re-review".

However, the mentor's role is not accepted by many referees. In a similar regard, a common problem is poor responsiveness of some referees, who agree to review and then sit on the paper for a long time.

The acceptance level is an Editor's instrument to match supply and demand (incoming papers *vs* available journal space). He may adjust the threshold of acceptance, seeking an equilibrium level dependent on circumstances. He navigates trying to avoid the two extremes: having a large backlog of accepted papers waiting for their turn to be published, and having too few accepted papers for the forthcoming issue.

Following the increasing tendency in the value of the impact factor of *HSJ*, the number of papers submitted has grown considerably, while the journal space remains constant. An increasing number of submissions competing for limited space is healthy and improves the scientific quality. Yet, an unwelcome side-effect may be a backlog of accepted papers, unless a more restrictive acceptance policy is in place. If reviewers are too uncritical, generously recommending acceptance, the quality suffers and the backlog of accepted papers grows. In addition, the pressure to publish special issues has increased, potentially leaving less room for regular submissions in a volume. Hence, the Editor has asked AEs to raise the standard for acceptance and to be more selective and more critical.

Improving the review process

Can the review system in *HSJ* be improved? To this end, avoiding the pitfalls mentioned earlier would help. The present practice fits the ethics of the scientific community and is a well-tried method that has supported scientific progress for a long time. Any steps to change the system should be taken with care and presuppose the consensus of a large majority of the hydrological community. One could try to install a mixed system, whereby the business-as-usual (half-blind system) is still a default standard, but authors may express their wishes for open or blind reviews.

Enhancing open review could be an option. Authors, who receive signed reviews, may be more likely to sign their own reviews. Actually, this avenue has already been

pursued in *HSJ*, as referees declare in the *HSJ* Review Form whether they agree to disclose their identity to authors. Some (but not many) do, and this is a precursor of open review, while most (including AEs) do not, so we cannot force this issue without the risk of losing referees. Even if *HSJ* could encourage open reviews, it should not be obligatory. There is definitely a smaller pool of referees ready to serve in the eponymous mode in *HSJ*. We could extend the review form by the asking referees: "if you prefer to remain anonymous, could you briefly explain why this is the case? Your statement could help us improve the review system in *HSJ*". We could enhance open reviewing by keeping track of eponymous referees and trying to arrange for eponymous reviews of papers authored by them.

A small token of appreciation to referees is an acknowledgement and a list of all referees who have reviewed *HSJ* submissions in the previous year, published in each February issue of the Journal. A side effect of this list is disclosure of the pool of referees—a move towards open review. Due to the time delay, identification (guess) of a referee's identity is less emotionally charged.

One could envisage, in rare pilot cases, a publicly open review (included as an appendix to the manuscript on the web page). Such an option could be considered in *HSJ*, especially if the review presents a different (but valid and valuable) view. However, referees often make good constructive comments and the revised draft is greatly improved. In such cases, publication of the original submission along with the review does not make much sense—readers would prefer to see the final product, being less interested in the details of the "kitchen". Besides, there is always the option to publish a comment by the referee, provided that it indeed presents a different, valuable viewpoint.

CONCLUDING REMARKS

Can problems in the existing half-blind peer-review system be avoided? Basically, two approaches are possible: being either more anonymous or less anonymous. Accordingly, the present half-blind (half-open) system may be replaced either by a fully blind or by a fully open system. Yet, these systems also have disadvantages. Hence, according to the Association of Learned and Professional Society Publishers (ALPSP, 1999) survey (cf. Rowland, 2002), about 70% of authors were at least satisfied with the current system of peer review. As Okal (2003) puts it, the debate on peer review has been going on for a long time: "It may be the worst possible system, but by and large it works."

How could one improve the review system in *HSJ*? Rather than suggesting a radical and revolutionary move, one could try to avoid the pitfalls identified in the present article. A top-down move to a fully open or fully blind system in *HSJ* does not look feasible. In the former case, the processing time of submitted papers might grow considerably (and unacceptably) due to the reluctance of many referees to sign their reviews. In the latter case, much effort would be needed to render a submission truly anonymous by eliminating tracks that indicate identity, which in some cases would be impossible. However, a mixed system could be worth striving for in *HSJ*, with the default half-blind process and wherever possible, encouraging signing of reviews.

Acknowledgements Thanks are due to Dr Cate Gardner, IAHS Press Manager, and

Dr Bellie Sivakumar for providing useful literature hints and useful reviews of earlier drafts. Thanks are also due to Mrs Frances Watkins for editorial assistance.

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