

Challenges in peer review, a lesson for improving technical government regulations in the hydrotechnical field

Provocări în evaluarea inter pares, o lecție pentru îmbunătățirea reglementărilor tehnice guvernamentale în domeniul hidrotehnic

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Abstract. *Since hydrotechnical is a broad topic, the peer review process is extremely important in maintaining the quality and validity of technical government regulations.*

Peer review is necessary to improve government technical regulations in the hydrotechnical field, as it is observed from ISI articles on some of these regulations which are characterized by eclecticism.

A primary challenge in peer review is finding specialists who are capable of reviewing technical documents. This challenge is also relevant regarding government regulations. Solutions to this challenge include maintaining a database of academic specialists, incentives to participate, and encouraging collaboration between agencies and academic institutions.

Disclosure of the reviewers' identities and the provision of guidelines for the review process of technical regulations should be a priority of the relevant authorities, as it would promote transparency.

Regulations should be designed as adaptable and responsive to changes and new information in order to address the dynamic nature of hydrotechnical issues.

Key words: *Peer review; Hydrotechnical regulations; Government normatives; Transparency in regulations; Adaptability in regulations; Regulatory quality; Academic specialists; Ecological flow*

1. Introduction

Government regulation is crucial for operation of society as it safeguards the equity, integrity and efficacy of different domains, including hydrotechnics.

Subjecting the technical regulations to a critical evaluation by people who possess vast knowledge and experience in the relevant field can be done according to the Peer-review model of articles in internationally indexed scientific journals. [1]

Peer review is an important phase in the scholarly publication process since it makes sure that research publications are of a high enough quality and novelty before they are published. It assists in weeding out subpar research, guarantees precision, and upholds the integrity of scientific publications.[2]

The academic and scientific publishing process includes several forms of peer review. The selection of peer-review methodology is frequently contingent upon the specific academic discipline, the characteristics of the research being conducted, and the editorial inclinations of the scholarly publication or conference in question. The broad nature of academic research is also a characteristic of legislation, the many types of peer-reviews being relevant also for the creation and selection of government normatives. [3]

2. Peer review process

In the following paragraphs some of the most adopted peer review methods are described.

In a single-blind review process, the reviewers possess knowledge regarding the identities of the authors, while the authors remain unaware of the identities of the reviewers. Maintaining impartiality is a widely adopted approach that enables reviewers to evaluate the work in consideration of the authors' background. [4]

The double-blind review entails that both the reviewers and the authors identities remain anonymous. This method of peer review is more stringent and its objective is to eliminate potential biases.

In the context of an open review process, it is acknowledged that both the reviewers and the writers possess knowledge of each other's identities. The purpose of this transparent procedure is to foster accountability and transparency. There are multiple approaches to accomplish this, one of which involves the inclusion of reviewer comments alongside the text during the publication process.

Post-publication review entails that the article is published before the peer review process, as comments and feedback from fellow researchers and readers come after the publication and the article undergoes revisions while being already published.

Collaborative review entails the collective participation of multiple reviewers in the assessment of an article. This methodology has the potential to offer a more extensive and varied evaluation of the task at hand.

Rapid review is a streamlined variant of the peer review process that aims to speed up the publication timeline. Frequently, a more concentrated evaluation of the fundamental components of the text is undertaken in order to expedite the duration between manuscript submission and publishing. [5]

Certain academic journals employ an internal evaluation procedure whereby editors or members of the editorial board evaluate the manuscript prior to its submission for external peer review. The internal review process serves to identify and

Challenges in peer review, a lesson for improving technical government regulations in the hydrotechnical field exclude submissions that may not adhere to the established standards of the publication. [6]

In the pre-publication review process, authors distribute their manuscripts to a group of academics in the respective subject prior to formally submitting them to a journal. This informal evaluation assists authors in refining their work prior to the official submission.

3. Peer review application for government regulations

Rigorous evaluation of scholarly research is at the base of peer review, and can provide significant benefits in the development of governmental normatives.

Peer review would entail subjecting proposed regulations to critical evaluation by individuals possessing extensive knowledge and experience in the pertinent domain. These individuals possess the ability to detect potential flaws, gaps, or unintended repercussions that may not be readily discernible to policymakers who do not possess the same level of specialised knowledge. By utilising the knowledge and expertise of academics and researchers, laws can be formulated with enhanced clarity and efficacy.

Peer reviewers are commonly characterised by their impartiality and objectivity since they concentrate exclusively on assessing the strengths and weaknesses of proposed rules. The impartiality exhibited in this context serves to mitigate the impact of political factors, so guaranteeing that regulations are formulated based on their inherent value rather than being influenced by partisan objectives. This factor enhances the credibility and impartiality of regulatory determinations. [7, 8]

Peer review serves as a tool to ensure the quality of government rules. The implementation of thorough examination conducted by impartial professionals can effectively detect inaccuracies or vulnerabilities in suggested legislation, hence diminishing the probability of incurring expensive errors or unforeseen repercussions. This facilitates the overall efficacy of regulations and their capacity to accomplish their intended objectives.

Academics can greatly contribute the field of government regulations by being involved in the review process. Their inclusion facilitates cooperation and recognition of wider viewpoints and considerations into the formulation of government rules.

The inclusion of the peer-review process in the creation of government regulations enhances transparency and fosters public trust. The act of being transparent and implicating academics in regulatory proposals fosters public trust as it demonstrates a willingness to undergo external evaluation, hence enhancing confidence in the regulatory process.

4. Case study

The case study refers to the methodology for determining ecological flows HG 148/2020.

Until 2020, environmental flow in Romania was assigned a constant value throughout the year, which led to ecological responses such as local extinction for the native species [10,11,12,13]. At the moment, ecological flows are implemented by HG 148/2020 [14].

According to Wei's research [15,16], ecological flow calculation falls into four categories, with the primary approaches shown in table no. 1

Table 1

| Ecological flow calculation methods | | | |
|--|--|---|--|
| Categories | Methods | Advantages | Disadvantages |
| Hydrology methods | Tennant method; Texas method; Flow Duration Curve (FDC) method; Range of Variability (RVA) method; Monthly frequency calculation method. | The methods are simple and convenient and do not require on-site monitoring. | The accuracy of the methods is low, due to single factor. |
| Hydraulic methods | Wetted perimeter method; The region 2 cross(R2-CROSS) method. | The methods take account of the hydraulic factors. | The methods do not reflect seasonality and needs many rivers topographic data. |
| Habitat simulation methods | Instream Flow Incremental Methodology (IFIM); Computer-Aided Simulation Model for Instream Flow (CASIMIR); Physical Habitat Simulation Model (PHABSIM). | The theoretical basis is sufficient and meets the requirements of representative species. | The methods consider limited river biological species and find it difficult to reflect the overall situation of river ecosystem. |
| Holistic methods | Building Block Methodology (BBM); Downstream Response to Imposed Flow Transformations (DRIFT); Scientific Panel Assessment Method (SPAM); Ecological Limits of Hydrologic Alteration (ELOHA). | The methods consider economy, society, ecology, and environment. | The methods require a large amount of data support, with complex calculation. |

HG 148/2020 was announced through the publication of an article by the creators of the governmental methodology.

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A manuscript prior to the normative HG 148/2020, with authors from INHGA, the institution that developed the normative specifies the following:

1. The discharges are to be calculated using natural or naturalized/estimated flows for a 30-year period (recent records), in order to account for dry, wet, and normal hydrologic years as well as the effects of climate change [17]. According to the World Meteorological Organization's (WMO) a 30-year series is in accordance with hydrological practice recommendations. WMO specifies the reference periods, namely 1931-1960, 1961-1990, 1991-2020;
2. The dynamic component of ecological flow related to hydrological forecasting is considered an original contribution of the article [17];
3. According to a presumption made in relation to the ecological flow calculation, the natural flow supports the habitat needs of the dominant fish species (for each river typology) that have persisted over time (existed prior to 1964, i.e. were mentioned in The Treaty on the Fauna of Romania, Volume 13—Fishes, published by the academician Dr. Petre Mihai Bănărescu), and still exist in light of the findings from the monitoring campaigns run by the National Administration Authority "Romanian Waters" [17];
4. The paper mentions that it takes into account hydrological regimes, which are identified as high, medium and deficient water regimes [17].

It should be specified that the regulation contains all the principles stated in the article, but later some are refuted by the studies carried out by the INHGA and by the response to the addresses of the beneficiaries of the hydrological studies for the ecological flow, thus:

1. The ecological flows provided in the year 2022 to some owners of hydropower works were for the period 1986-2015 and not 1991-2020. The explanations of the author of the study were by quoting by truncation of the normative HG14/2020. It is interesting that after the exchange of these addresses, the hydrological studies for ecological flows for the period 1991-2020 were developed;
2. The dynamic component of the ecological flow is actually a quasi-static one, disregarding the hydrological regime. Thus, longitudinal connectivity is not ensured in the period of low water, for all water intake works, and in the period of high water, longitudinal connectivity is not ensured for reservoirs with annual and multi-annual regularization [18];
3. It does not take into consideration the updated studies requested by ANAR regarding the ichthyofauna, using an old literature from 1964 that studied a few reference rivers and designed the habitats for all of Romania. In the 1964 treaty, it is specified that preferences are actually presented in relation to biotope and zoogeography conditions [19], which cannot replace the current studies and those before the realization of hydrotechnical arrangements. INHGA and ANAR, through an action worthy of a conjurer, misrepresent the scientific reality.

- The hydrological regime is not given by the average monthly flows according to the statements of the INHGA authors [17], it is given by the average daily flows and the idea of "imitating" a natural hydrograph is completely far from the truth if we analyze a simulation of the application of the ecological flow on river Uz [18].

The ecological state of water bodies, particularly hydromorphological indicators, is seriously threatened by HG 148/2020. The primary criticism, especially for rivers in natural protection areas, is the reduction in flows for unusually extended periods of time, at least eight months each year.

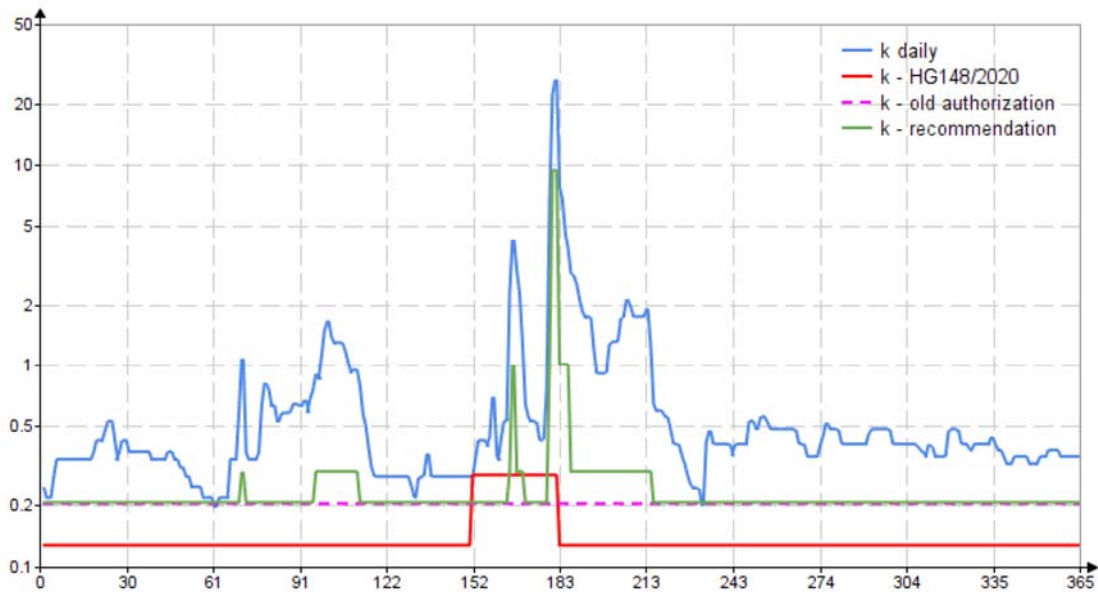


Fig. 1. The values for the ecological flows as a result of the approaches used at the Uz site are shown in a time series for the module of average daily flows.[18]

In addition to these misinterpretations of a "so-called ecological" debit standard, the following wrong practices of INHGA and ANAR overlap:

- Hydrological studies are issued without respecting the right to water on the legal and European principle of first come first served, thus hydrological studies, notices and water authorizations that limit the right to water to some existing uses are issued, such as a few well-known cases: Runcu, Galbenu, Suceava;
- The ecological flow rate is not applied correctly, there are cases in which tables with lower values are taken from the INHGA studies in the authorization, or reference is made strictly to the study without presenting the table with the ecological flow rates, thus the valley of a river is practically dry (the case of Baia de Fier, Gorj county);
- Issuance of wrong rights on water uses by ANAR, which are included in INHGA hydrological studies, which become mandatory;

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- Conducting wrong studies on flow rates through similarities with other river basins without considering the global balance of a receiving basin.

These aspects presented above would have been avoided if the technical regulation was carried out with the official participation of technical universities in Romania.

5. Conclusion

In conclusion, it is essential to include academics into the review process of government regulations. By including them as peer reviewers, the regulatory system would be stronger, more efficient and more flexible.

Peer review, at its essence, functions as a means of assessing the credibility of experts, introducing a rigorous evaluation process that guarantees rules are firmly grounded in robust scientific, technological, and professional knowledge. The participation of academics with experience and knowledge in a particular issue can serve as a safeguard against the unintentional dissemination of incorrect information or defective logic, promoting regulations that are both precise and up-to-date with the current developments. [9]

As shown by the case studies, sometimes government regulation can be wrongfully interpreted and can lead to confusion.[18] The peer review process, which can prevent instances such as those shown in the case study, encompasses more than just verifying factual accuracy. The system functions as a diligent protector against mistakes, discrepancies, or uncertainties that have the potential to undermine the comprehensibility and enforceability of regulations. By engaging in thorough scrutiny, academics can make valuable contributions to the development of technical regulations. This, in turn, can promote a climate of adherence to these regulations.

The establishment of transparency and accountability through peer review is crucial for fostering public confidence, which is a fundamental element of an effective government. The public's trust can be fostered by the fact that regulations are subject to examination by impartial academics. The establishment of trust plays a crucial role in creating a strong foundation for the regulatory system, as it leads the public to view rules as the result of well-informed decision-making rather than arbitrary impositions. [20]

Furthermore, the process of peer review will promote the development of adaptation and flexibility within regulatory frameworks. By establishing a consistent feedback loop, it can facilitate the recognition of developing obstacles and the integration of fresh data. The iterative nature of this method will guarantee the ongoing relevance and adaptability of regulations in the face of evolving circumstances, including technical breakthroughs, societal changes, and emerging hazards. Within this dynamic interplay, rules that undergo peer review would transform into living documents that adapt to address the demands of a swiftly evolving global landscape.

The peer review method can enhance the legal defensibility of rules. The endorsement of university examination would confer an additional level of legitimacy that can prove pivotal in instances where regulations encounter legal disputes. The

comprehensive evaluation conducted by colleagues acts as evidence of the meticulousness and procedural fairness that underlies the regulatory decision-making process, enhancing the legal credibility of the regulatory system. [21]

Efficiency and effectiveness, which are considered fundamental elements of sound governance, would be enhanced through the proactive function of peer review. Through the implementation of rigorous examination, peer review could serve as a mechanism to minimise regulatory overreach, so ensuring that regulations remain proportionate to their intended objectives. The adoption of this well-balanced approach would effectively reduce the potential negative impact on innovation and economic development, while simultaneously ensuring the protection of public welfare.

Fairness, informed decision-making, and adaptability in the field of hydrotechnics would be some of the benefits that the inclusion of academics as peer reviewers in the regulatory process would bring. This fact would undeniably create a more transparent, inclusive and fair regulatory process.

References

- [1] Kelly J, Sadeghieh T, Adeli K. Peer Review in Scientific Publications: Benefits, Critiques, & A Survival Guide. *EJIFCC*. 2014 Oct 24;25(3):227-43. PMID: 27683470; PMCID: PMC4975196.
- [2] Benjamin K. Sovacool, Jonn Axsen, Laurence L. Delina., Hilary Schaffer Boudet, Varun Rai, Roman Sidortsov, Sefa Awaworyi Churchill, Kirsten E.H. Jenkins, Ray Galvin, Towards codes of practice for navigating the academic peer review process, *Energy Research & Social Science*, Volume 89, 2022, 102675, ISSN 2214-6296, <https://doi.org/10.1016/j.erss.2022.102675>.
- [3] Tennant, J.P., Ross-Hellauer, T. The limitations to our understanding of peer review. *Res Integr Peer Rev* 5, 6 (2020). <https://doi.org/10.1186/s41073-020-00092-1>
- [4] Shoham, Natalie & Pitman, Alexandra. (2020). Open versus blind peer review: is anonymity better than transparency?. *BJPsych Advances*. 27. 1-8. 10.1192/bja.2020.61. [5] *** COSMOS/M – Finite Element System, User Guide, 1995.
- [5] Tennant JP, Ross-Hellauer T: The limitations to our understanding of peer review. *Res. Integr. Peer Rev.* 2020;5(1):6. 10.1186/s41073-020-00092-1.
- [6] Ferreira C, Bastille-Rousseau G, Bennett AM, et al. The evolution of peer review as a basis for scientific publication: Directional selection towards a robust discipline? *Biol Rev Camb Philos Soc* 2016;91(3):597-610.
- [7] Smith R. Peer review: a flawed process at the heart of science and journals. *J R Soc Med.* 2006;99(4):178–82.
- [8] Mavrogenis, A.F., Quaile, A. & Scarlat, M.M. The good, the bad and the rude peer-review. *International Orthopaedics (SICOT)* 44, 413–415 (2020). <https://doi.org/10.1007/s00264-020-04504-1>
- [9] Johnson JL, Adkins D, Chauvin S. A Review of the Quality Indicators of Rigor in Qualitative Research. *Am J Pharm Educ.* 2020 Jan;84(1):7120. doi: 10.5688/ajpe7120. PMID: 32292186; PMCID: PMC7055404.
- [10] Poff, N.L.; Allan, J.D.; Bain, M.B.; Karr, J.R.; Richter, B.; Sparks, R.; Stromberg, J. The natural flow regime: A new paradigm for riverine conservation and restoration. *BioScience* 1997, 47, 769–784.

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- [11] Arthington, A.H.; Pusey, B.J. Flow restoration and protection in Australian rivers. *River Res. Appl.* 2003, 19, 377–395.
- [12] Arthington, A.H. *Environmental Flows*. In *Saving Rivers in the Third Millennium*; University of California Press: Berkeley, CA, USA, 2012; p. 406.
- [13] Lytle DA, Poff NL. Adaptation to natural flow regimes. *Trends Ecol Evol.* 2004 Feb;19(2):94-100. doi: 10.1016/j.tree.2003.10.002. PMID: 16701235.
- [14] H.G. 148/2020; *The Method of Determining and Calculating the Ecological Flow*. The Government of Romania: Bucharest, Romania, 2020.
- [15] Wei, N.; Xie, J.; Lu, K.; He, S.; Gao, Y.; Yang, F. Dynamic Simulation of Ecological Flow Based on the Variable Interval Analysis Method. *Sustainability* 2022, 14, 7988.
- [16] Karakoyun, Y.; Dönmez, A.H.; Yumurtacı, Z. Comparison of environmental flow assessment methods with a case study on a runoff river–type hydropower plant using hydrological methods. *Environ. Monit. Assess.* 2018, 190, 722.
- [17] Gălie, A.-C.; Mătreacă, M.; Tănase, I.; Rădulescu, D. The Romanian Ecological Flow Method, RoEflow, Developed in Line with the EU Water Framework Directive. Concept and Case Studies. *Sustainability* 2021, 13, 7378. <https://doi.org/10.3390/su13137378>
- [18] Ilinca, C.; Anghel, C.G. Re-Thinking Ecological Flow in Romania: A Sustainable Approach to Water Management for a Healthier Environment. *Sustainability* 2023, 15, 9502. <https://doi.org/10.3390/su15129502>
- [19] Bănărescu, M.P. *Fauna of the Romanian People’s Republic, Volume XIII. Pisces—Osteichthyes*; Publishing House of the Academy of the Romanian People’s Republic: Bucharest, Romania, 1964; 962p.
- [20] Abdi, AN.M. The mediating role of perceptions of municipal government performance on the relationship between good governance and citizens’ trust in municipal government. *GPPG* (2023). <https://doi.org/10.1007/s43508-023-00073-2>
- [21] Tampubolon M, Situmeang T, Saragih P. Judicial breakfast as an external factor in judicial decision making in courts. *F1000Res.* 2023 Jan 4;12:9. doi: 10.12688/f1000research.126482.1. PMID: 36911239; PMCID: PMC9999048.