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30 years of women in science in Italy through the lens of the Major Risks Commission

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Abstract

In Italy, the National Commission for the forecasting and prevention of the Major Risks is a technical-scientific advisory body of the Civil Protection Department. Its contributions are fundamental for implementing strategies for forecasting and preventing civil protection risks and for emergency management from a technical-scientific point of view. The Commission was officially established in 1992. Since then, it has continued to operate to this day, albeit with varying organisation and internal composition over time. The Commission has always been composed of high-level experts from various scientific disciplines related to the different risks addressed by civil protection. As such, it can be considered as an indicator for the gender balance within the scientific community engaged on disaster risk for over 30 years.

In this work, we analyse the number and gender distribution of the Commission's members since its establishment, to investigate the absolute numbers, percentages and role played by women scientists over the considered period. For the last decade, we have compared our results with the most recent gender analysis for the Academia and Research Institutes, conducted by the National Agency for the Evaluation of the University and Research System (ANVUR). Our results show that, although the percentage of women in the Major Risks Commission is broadly in line with the Academia in Italy, this merely reflects a wider, persistent underrepresentation at senior levels. A general increase can be observed over time, but the growth is still limited. The reasons for this

reduced female presence are also explored, together with some possible actions aimed at increasing the number of women in these contexts.

Keywords: Gender balance, STEM careers, Disaster Risk Science, Civil Protection.

1. Introduction

The scientific disciplines that contribute to knowledge, reduction and management of disaster risks in the field of civil protection mainly fall within the STEM (Science, Technology, Engineering and Mathematics) area. The current state of gender inequality in this sector of the scientific community is well known and quantified worldwide (e.g., Elsevier Gender Report, 2024; European Commission, 2024). This condition is also observed in Italy, where it is recognised both in Research Institutes and, even more so, in Academia (Agnini et al., 2020; ANVUR, 2023). This general imbalance is even more evident when analysing career progression in different disciplines, with a clear reduction in the number of women holding senior management positions.

In Italy, expertise in STEM subjects is particularly sought after in the composition of the National Commission for the forecasting and prevention of the Major Risks. Often referred to simply as the Major Risks Commission, it is a technical-scientific advisory body of the Italian Civil Protection Department (ICPD[1]) (Legislative Decree 1, 2018). It provides technical-scientific opinions and advice on questions and topics posed by the Head of the ICPD in relation to the various types and potential risk situations, imminent or ongoing. It can also provide proposals for updating or improving skills in the assessment, forecasting and prevention of civil protection risks[2]. Its contributions are fundamental for implementing strategies at forecasting and preventing civil protection risks as well as for technical-scientific emergency management (Dolce et al., 2020).

The longstanding collaboration between the Italian civil protection and the scientific community began in the 1970s. Steps toward establishing a Major Risks Commission

[1] https://www.protezionecivile.gov.it/en/ (accessed 25 July 2025).
[2] https://servizio-nazionale.protezionecivile.gov.it/it/organi-collegiali/ (accessed 25 July 2025).

were taken during the 1980s, but its formal institution came in 1992[3]. Since then, the Commission has remained active, albeit with variations in its organisation and internal composition.

The Commission has always been composed of high-level experts in various scientific disciplines related to the different risks addressed by civil protection. As such, it can be considered as a reflection of the gender balance of the scientific community engaged on disaster risks for over 30 years.

In this work, we analyse the number and gender distribution of the Commission's members since its establishment. Based on the official Prime Minister's and Minister's Decrees appointing the members of the Commission, we investigate the absolute numbers, percentages and role played by women scientists over the considered period. For the last decade, we compared our results with the most recent gender analysis relating to Italian Academia and Research Institutes, carried out by the National Agency for the Evaluation of the University and Research System (ANVUR, 2023).

Our results show that the percentage of women in the Major Risks Commission is relatively low, but almost in line with the percentages observed at the highest levels of the Academia. A general increase can be observed over time, but the growth is still limited. As we will discuss, there are several factors that may explain this underrepresentation of women.

2. The Major Risks Commission

2.1. Background

Collaboration between scientists and civil protection decision-makers in Italy dates back to 1976, when it was conceived by the then Emergency Commissioner, Giuseppe Zamberletti (1933-2019), as a support in managing the Friuli earthquake (Dolce and Di Bucci, 2015; 2022).

The relationship between the scientific community and the National Civil Protection Service was later codified in Law 225/1992. This law included the technical-scientific institutions (e.g., academia, research bodies) among the national operational structures of the National Service. In addition, for the first time this law formally established the "Commission for the forecasting and prevention of Major Risks." This body was, and still is, acknowledged as the preeminent technical and scientific

[3] Law 225/1992: Istituzione del Servizio Nazionale della Protezione Civile [Establishment of the National Civil Protection Service]. https://www.gazzettaufficiale.it/eli/id/1992/03/17/092G0253/sg (accessed 25 July 2025).

advisory entity of the ICPD, tasked with forecasting, anticipating and mitigating a wide range of potential risks (Legislative Decree 1, 2018, art. 20). Its technical-scientific perspective and contributions are fundamental for implementing strategies at forecasting and preventing civil protection risks and supporting emergency management.
The Major Risks Commission is the highest-level expression of the civil protection scientific community in Italy. It is an independent scientific advisory body of the ICPD, although it does not belong to the Department itself. The organization and functions of the Commission have been redefined over the years, last time in 2023 (Ministerial Decree, 8 February 2023). The Commission provides:

- technical-scientific advice on issues and topics posed by the Head of the ICPD concerning various potentially risky situations, imminent or ongoing;
- proposals to update or improve methods for the assessment, forecasting and prevention concerning civil protection risks.

The Commission is currently structured in a Presidency Office and eight Sectors, each addressing a specific category of risk: 1. seismic; 2. volcanic; 3. tsunami; 4. hydraulic, hydrogeological, climatic and weather phenomena; 5. forest fires and water deficit; 6. nuclear and radiological; 7. chemical, technological, industrial and transportation; 8. environmental and health.
Each Sector has a designated coordinator and a maximum of 8 members selected from the scientific community at large. The term of the Presidency office is 5 years. The Commission convenes separately for each risk Sector or in joint meetings for the analysis of interdisciplinary issues. A plenary session is normally held once a year, usually at the premises of the ICPD. To obtain further scientific input, the President may also invite external specialists from the technical-scientific world, territorial civil protection authorities or other bodies and administrations, both private and public. According to the current rules, as long as the formal communications of the Commission are concerned, regulation requires that the outcomes of each meeting must be summarised in official minutes, which are then sent to the Head of the ICPD. In case of specific communications, these outcome results may be also summarised in a public statement, which is the only official channel to make the Commission's opinions available to the public.

2.2. The Major Risks Commission through the years

Since its establishment in 1992, The Major Risks Commission has operated until today. Over the 30 years period analysed, the Commission has been renewed many

times, and its internal structure has been often changed by law. These changes are also the result of a different view on the relationship between the scientific community and civil protection decision-makers.

Year	Number of Sectors
2023	8
2017	5
2011	5
2006	5+1
2002	8
1995	7
1994	7

Table 1. *Number of Sectors of the Major Risks Commission over the years (in 2006, in addition to 5 sectors dedicated to natural and anthropogenic hazards, a sector dedicated to civil protection was also established).*

The analysed Commissions were appointed in 1994, 1995, 2002, 2006, 2011, 2017, and 2023. Notably, for the first time, the current regulation (Ministerial Decree, 8 February 2023) includes a requirement for "adequate gender representativeness."
The Commission has always been organised into Sectors, from a minimum of 6 to a maximum of 8 (Table 1), each covering specific risks. However, these risks have changed over time. Some risks like seismic, volcanic, and hydrogeological, have always had a dedicated Sector in the Major Risks Commission, whereas other risks, like nuclear or health risks, only in some of them.
From 1994 to 2002, the Presidents of the Commission used to be political figures in office, e.g., Member of Parliament, Undersecretary of State or Prime Minister. Thereafter, the role has been consistently held by scientists, with the exception of Giuseppe Zamberletti, who served however in a symbolic capacity of a founding figure, rather than as an active politician.
Total membership has also varied over time, with a maximum of 90 in 2002 and a minimum of 21 in 2006 (Figure 1, Table 2).
The Commission has always been composed by high-level experts from various scientific disciplines related to the different risks addressed by civil protection. Therefore, it can be considered a proxy for the gender balance within the represented scientific community for over 30 years. Since the composition and number of members of the Commission have changed a lot over the years, we emphasise the importance of analysing not only the women/men distribution in absolute values, but especially their relative proportions, i.e., the gender percentage of the members.

Year	Number of Members
2023	64
2017	34
2011	61
2006	21
2002	90
1995	73
1994	79

Table 2. *Number of members in the Major Risks Commission over the years.*

3. Data collection and analysis

3.1. Data describing the Major Risks Commission

In this work, we analyzed the composition and gender distribution of the Major Risks Commission's members since the official establishment of the Commission. We retrieved the Prime Minister's and Minister's Decrees appointing the members of the Commission, and investigated the absolute number, percentage and role played by women scientists over the considered period. The results of the data collection are shown in Tables 2 and 3, which report the total number of members, along with the number of men and women. The latter have also been expressed as percentages with respect to the total membership. Percentages will be used for comparison with independent datasets described in Section 3.2.

A comparison of the distribution of men and women over the years, in absolute numbers, is shown in Figure 1. A remarkable gender imbalance characterises all the Commissions analysed, with men consistently representing a large majority. Moreover, an analysis of the official documentation reveals that the most Sector coordinators were men. Only in 2006 and 2017, a woman was appointed as coordinator of one of the Sectors of the Commission. In 2023, this number doubled, with two women serving as coordinators. So far, the roles of President and Deputy-President have never been assigned to a woman.

The percentages of men and women present in the Commission over the years are shown in Figure 2. The graph points to a positive trend; however, the maximum value for the women (20.3%), observed in the 2023 Commission, still remains indisputably low.

Year	Men	Women	Men (%)	Women (%)
2023	51	13	79.7	20.3
2017	28	6	82.4	17.6
2011	56	5	91.8	8.2
2006	20	1	95.2	4.8
2002	82	8	91.1	8.9
1995	72	1	98.6	1.4
1994	78	1	98.7	1.3

Table 3. *Distribution of men and women in the Major Risks Commission over time.*

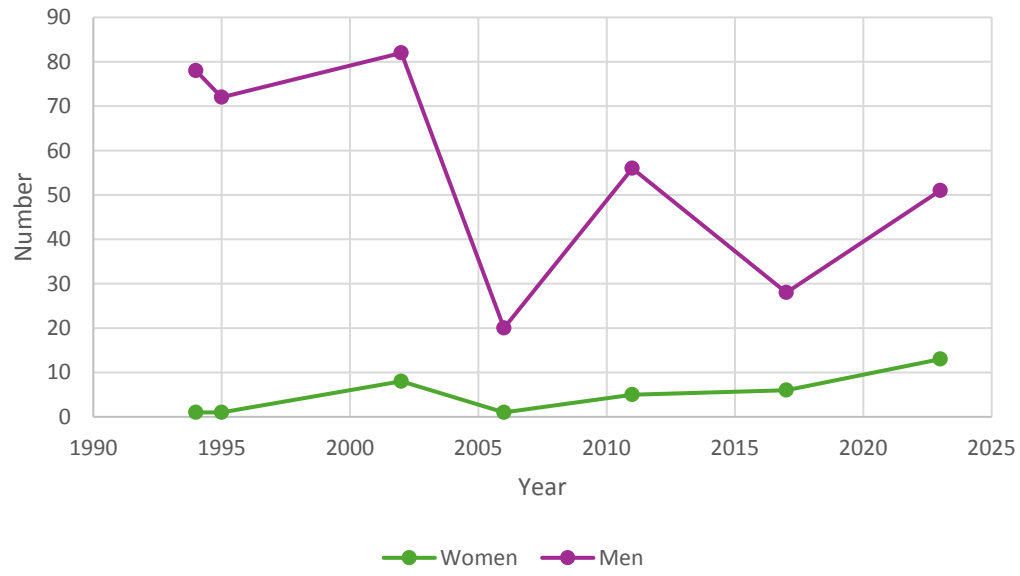

Figure 1. *Distribution of men and women in the Major Risks Commission over time in absolute numbers. Source data are reported in Table 3.*

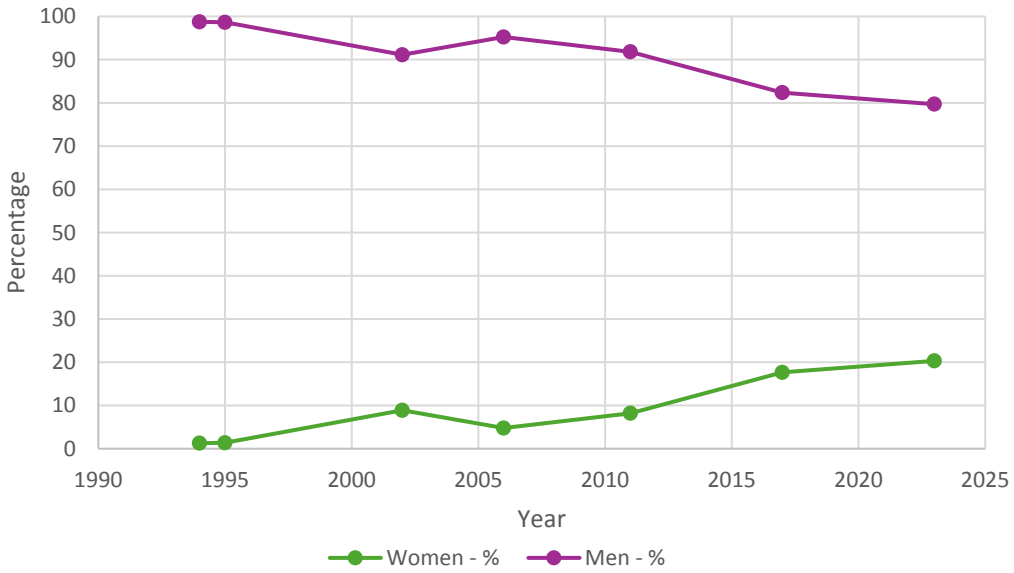

Figure 2. *Percentage distribution of men and women in the Major Risks Commission over time. Source data are reported in Table 3.*

3.2. Data describing the Italian Academia and Research Institutes

A gender analysis for the Academia and Research Institutes in Italy was conducted by the National Agency for the Evaluation of the University and Research System (ANVUR, 2023), covering the period from 2012 to 2022. From this report, we extracted data that allow for a comparison between the gender distribution in the Major Risks Commission during the same years and the main trends observed in the Academia and Research Institutes within comparable disciplines. The results of this extraction are displayed in Tables 4 and 5 and graphically shown in Figures 3 and 4. As for the Academia, it was possible to pull out the numbers related to the Full Professors, whose professional profile is the most comparable with the profile of the Commission members.

Year	Women (%)	Men (%)	Area
2012	9.4	90.6	Physics
2017	12.3	87.7	
2022	15.3	84.7	
2012	20.3	79.7	Chemistry
2017	25.7	74.3	
2022	35.7	64.3	
2012	18	82	Earth Sciences
2017	18.2	81.8	
2022	19.3	80.7	
2012	30.5	69.5	Biology
2017	33.3	66.7	
2022	38.1	61.9	
2012	16.8	83.2	Engineering & Architecture
2017	19.2	80.8	
2022	25.2	74.8	

Table 4. *Gender distribution among Full Professors in Academia from 2012 to 2022 (source: ANVUR, 2023). Values are expressed as percentages of male and female faculty.*

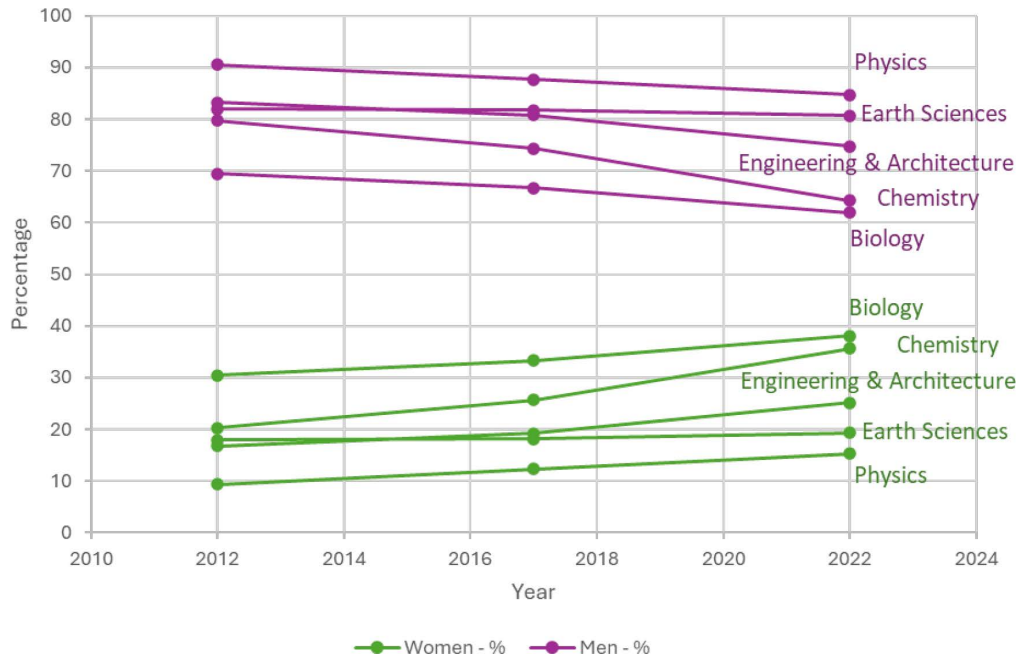

Figure 3. *Gender distribution among Full Professors in Academia from 2012 to 2022 (source: ANVUR, 2023). Values are expressed as percentages. Source data are reported in Table 4.*

Year	Women (%)	Men (%)	Research Institute
2012	31.9	68.1	
2017	35.14	64.86	INGV
2021	38.6	61.4	
2012	28.9	71.1	
2017	31.4	68.6	OGS
2021	38.2	61.8	

Table 5. *Gender distribution in Research Institutes from 2012 to 2021 (source: ANVUR, 2023). Values refer to Researchers and Technologists. INGV: Istituto Nazionale di Geofisica e Vulcanologia. OGS: Istituto Nazionale di Oceanografia e Geofisica Sperimentale.*

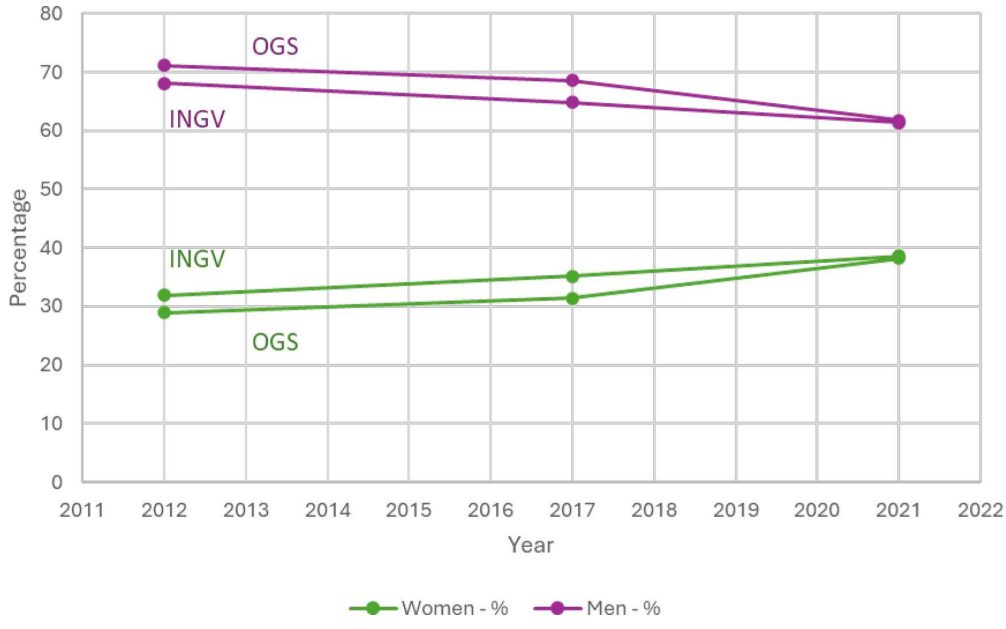

Figure 4. *Gender distribution in Research Institutes from 2012 to 2021 (source: ANVUR, 2023). Values refer to Researchers and Technologists and are expressed as percentages. Source data are reported in Table 5.*

3.3. Comparison

In general, data show a slight increase in the percentage of women over the years, both in Academia and in the considered Research Institutes. A similar trend can also be observed within the Major Risks Commission.
Coming to the observed percentages, the representation of women among Full Professors is particularly low, and notably lower than the corresponding values for Researchers and Technologists in the Research Institutes; this is not surprising, since, for example, the underrepresentation of women in the academic community of Earth Sciences, particularly among Full Professors, has already been discussed by Agnini et al. (2020) for Italy, and it is also well documented at the international level (PTGERI, 2024). Despite this, the mean percentage of Full Professors women in 2022, in the analysed areas of expertise in Italy, is 26,72%, a value that in any case is higher than the highest value of women in the Commission, that is 20.3% in 2023.

4. Discussion

Our results show that the percentage of women in the Major Risks Commission is relatively low, although broadly in line with the figures observed at the highest levels of the Academia. Even though a general increase can be observed over time, the growth remains modest.
It is well known that the percentage of women holding a university degree in STEM disciplines is low today and was even lower in the past (European Commission, 2024; PTGERI, 2024). Data reported Tables 3 and 4 mirror this fact.
Researchers and Technologists include younger scholars, and the percentages are higher than in Academia. Indeed, the situation is more critical than it may appear, due to the well-documented phenomenon known as the “leaky pipeline”, for which the women percentage declines at professional higher ranks. Moreover, the existence of a glass ceiling in Academia is well documented (e.g., European Parliament, 2015; European Commission, 2024), and this continues to limit the number of women with a Full Professor position. Therefore, the lack of full gender balance in the Major Risks Commission, as revealed by our analysis, was not unexpected. However, when appointing the 2023 Major Risks Commission, an effort was made to improve the number of women in compliance with the provision of the Ministerial Decree of 8 February 2023 mentioned in section 2.2, which required “ensuring adequate gender representativeness.” Nevertheless, the percentage of women in the Commission remains low.

Some considerations can be made to try to explain the reasons behind this persistently limited presence of women.
First, the technical skills historically required by the Major Risks Commission are predominantly found in STEM disciplines, which are crucial to the assessment of civil protection risks. As previously discussed, the number of women approaching these disciplines is low. It follows that women owning skills and expertise in one specific component of a specific risk (e.g., landslide hazard, or masonry buildings' seismic vulnerability) are particularly rare.
Secondly, a non-negligible proportion of the Commission members are selected among Full Professors and Research Managers and, as previously observed, the number of women occupying these positions is limited. As a consequence, the pool from which female candidates can be drawn is restricted.
Finally, especially in earlier Major Risks Commission, several members were selected from higher hierarchical levels of State Technical Agencies. Although this criterion is apparently neutral, it is instead strongly biased, because these positions were (and still are) largely occupied by men. For instance, if the member to be selected is the president of a national institute, the probability that this person will be a man is very high.
Under this perspective, the Major Risks Commission not only reflects the imbalance of the number of women in risk science, but also in the public high hierarchies.

5. Perspectives

The above reflections on the current situation and possible reasons behind the data lead us to consider what could be done to improve gender representation in science for civil protection. It is evident that this is a specific part of a broader problem of gender balance, which is systemic in our society. Addressing the latter issue is beyond of the scope of this paper, but we believe that the correct approach is to promote a better balance by seizing every possible opportunity. Therefore, something could also be done in the specific sector of the Italian Major Risks Commission, both now and in the near future.
In the short term, the opinions of the women scientists who are currently members of the Commission could be gathered. A focus group with them, for example, could help to obtain directly from these scientists, who know their world well, suggestions and proposals on how to increase the presence of women in the Commission. Meetings on the subject could also be organised with public administrations similar to the ICDP, to raise awareness among senior management and find common solutions to tackle the problem. Moreover, even in the activities that the civil protection

system carries out with schools, it would be useful to address the issue of gender representation in the world of disaster risk science, to encourage girls and young women not to be afraid to study and work in the field of STEM disciplines.
In the future, moral suasion could be exerted on scientific competence centres that have representatives on the Commission to encourage them to promote more women to this role. It would also be advisable to make one's voice heard at the Ministry of University and Research in order to encourage more women to take up Full Professorships, using the Commission as a case study.
Finally, there are also some actions that could be taken in the constitution of the next Major Risks Commission. For example, even without formalising quotas for women, consideration could be given to including a greater number of women among the external experts, who are selected directly by the ICPD. Similarly, efforts could be made to promote a greater number of women to the role of Sector coordinator and as President and Deputy-President of the Commission.

6. Conclusion

This work has explored the presence of women scientists over the time within the Italian Major Risks Commission, considering this group of high-level experts as a good proxy for a broader representation of women in the Italian scientific community engaged on disaster risks. The data collected and their analysis show a low percentage of women in this context, although a gradual positive trend over the years is visible. The study also shows that a prescription in a formal regulation to ensure adequate gender balance is not sufficient to achieve the goal of a meaningful representation of women, as this is also related to an overall increase of the women's presence in the highest hierarchical levels of other institutions, such as Academia, Research and Public Administration.

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