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Interfacing risk logic, riskification, and risk governance: some research implications.

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There is an increasingly widespread scientific recognition that there are systemic risks, for example climate change, which are studied as security issues. This paper addresses possible interfaces between the constructivist approach of riskification and the realistic approach of risk governance, by proposing three analytical categories of the exploration of security topics like climate change: how the two approaches understand 1) risks, 2) actors, and 3) tools and practices. Riskification builds on securitization theory and argues that securitization has not been able to clarify what distinguishes threats from risks. Risk governance combines normative political theories with risk science and promotes a realist perspective on risks. Riskification is supported by a risk logic, which posits that the identification and management of risks can be governed through the purposive guidance of the public towards a particular way of thinking and acting. Bringing together these two perspectives improves the analysis of contemporary risks and threats phenomena, such as climate change or pandemics, in addition to expanding the number of explanations and the understanding. Furthermore, this paper promotes linkages between riskification and risk governance, to increase knowledge on which risks are prioritized and which actor constellations deal with these risks, to develop proper policies and planning.

Keywords: Securitization, riskification, risk governance, risk logic, climate change, interfaces.

1. Introduction

There is an increasingly widespread scientific recognition that there are systemic risks, for example climate change, which are studied as security issues (see Diez et al. 2016). A framework of analysis for the study of phenomena that are a threat to security is securitization. Securitization theory describes a securitization move, which consists of a securitizing actor, who defines who/what should be protected (referent object) from which threat (referent subject) and with what means (extraordinary measures), via speech acts and practices (Buzan et al. 1998, Balzacq et al. 2016).

Building on securitization theory, Corry (2012) argues that securitization has not been able to clarify what distinguishes threats from risks. Thus, he proposes riskification, as a parallel and separate process from securitization, to explain how the consequences of threats like climate change can be understood in terms of risk and, therefore, frame policy responses guided by a risk logic, rather than a threat logic. Corry states that "whereas securitization involves a plan of action to defend a valued referent object against a threat, riskification implies a plan of action to govern the conditions of possibility for harm" (Corry 2012: 247). Although Corry's riskification is influenced by risk science language, riskification is still very much anchored within a securitization (and security studies) tradition.

In this paper, we aim to gather logical evidence about possible interfaces between the constructivist approach of riskification and the realistic approach of risk governance. We acknowledge that the epistemological foundations of riskification and risk governance are different. As such, we need to start by investigating their respective foundations to unfold these possible interfaces. Thus, we follow a rather theoretical and exploratory approach in this paper, by analyzing the epistemological premises of riskification and risk governance. The paper is the starting point of a two-fold research process: first, we investigate the foundations of riskification and risk governance;

then we identify common grounds, based on explanations stemming from the theoretical investigation, to establish a certain number of interfaces or linkages.

We argue that bringing together these two perspectives can contribute to improving, in applied studies, the analysis of contemporary risks and threats phenomena, such as climate change or pandemics, in addition to expanding the number of explanations and the understanding. Furthermore, we argue that this will increase knowledge on which risks are prioritized and which actor constellations should deal with these risks, to develop proper policies and planning.

According to Renn (2008), risks are conceptualized in terms of contingency, i.e., the distinction between possible actions: simplicity, complexity, uncertainty, and ambiguity. To deal with uncertainties, future events and threats, actors, agents and societies, by organizing themselves, implement plans of action and create meaning to understand reality.

The logic beneath riskification – risk logic – has three main features: firstly, there is no longer a direct relationship between an existential threat and security. This means that "riskification is not characterised by an existential threat to a valued referent object leading to exceptional measures against external and ungovernable threatening others" (Corry 2012: 248). Secondly, the related actions are to govern the conditions of possibility of harm. Thirdly, emergency is replaced by a governmental policy of long-term societal engineering. Riskification can, thus, be viewed as an attempt to underline the distinction between risk and threat; nevertheless, the need to be more precise in utilizing the concept of risk in security studies remains (see Aradau and Van Munster 2007, Petersen 2008, 2016). The use of terms such as 'risk' and 'risk logic' gives substance to the understanding of empirical phenomena (i.e., climate change) according to three explanatory avenues: what triggers a risk thinking; to what extent systems are responding in a technocratic way and how this affects political choices and society as such; and which wicked problems are the most challenging.

This paper is organized as follows: first, we present riskification and risk governance, to explore their epistemological foundation; second, we propose certain linkages between riskification and risk governance, according to three categories (understanding of risk; actors; tools and practices); third, we discuss these linkages to develop a common ground of understanding between riskification and risk governance; fourth, in the conclusion, we propose new avenues of research.

2. Theoretical perspectives

2.1. *Riskification*

In its original form (Buzan et al. 1998), securitization theory emphasizes the social construction of threats and securitizing actors' responses to these threats through exceptional measures that go beyond normal politics. In securitization theory, in addition to securitizing actors, there are a referent object, an audience, and a referent subject. Securitizing actors securitize an issue by means of the security speech act to defend the referent object (such as states, ecosystems, societies) which is under threat. By accepting the securitization move by the securitizing actor, the audience makes securitization successful. Years of research on securitization has allowed us to move from this original understanding of securitization as the process by which an actor identifies a threat, attributes a special status to that threat and by so doing is able to justify and then execute "urgent and exceptional measures" in response (Buzan and Wæver 2003: 491). Work, including that of International Political Sociology (Bigo and Tsoukala 2008) and the 'material turn' (Müller 2015; Bengtsson et al. 2019) in securitization, shows the many ways in which securitization can take place, which include practices and tools with a more practice-oriented approach, focusing on 'the ordinary' or routine behavior (Balzacq 2010).

Riskification explores how certain security challenges (in particular, climate change) come to be understood as risks (Corry 2012), while highlighting the contrast with the threat construction in securitization. The core shift of riskification in respect to securitization rests in the *type of response*: while securitization considers defense as the main response, riskification proposes governing the threat or risk. This shift affects the referent object due to the high uncertainty, since actors no longer consider an external threat but *the conditions of possibility* of harm that need to be governed. Riskification moves from extraordinary measures and

emergency actions to the governance of risks via resilience, preparedness, and adaptation. The risk logic beneath riskification points towards the identification and management of risks through *societal engineering*, which is "the purposive guidance of the public towards a particular way of thinking and acting towards different kinds of risks and threats" (Odeyemi 2021: 80).

To define risk logic, we need to distinguish this concept from threat logic. Threats and risks influence the response to a security challenge (Corry 2012). Threat logic has the following characteristics: the source of danger is clearly defined within a time frame; it concerns a concrete and serious danger, which requires certain measures and urgent action by affected actors (Williams 2008). Risk logic concerns the possibility of harm that might be inflicted from multiple sources and means in an uncertain future time frame, and in which direct responses to the danger are lacking (Rasmussen 2006).

Riskification, thus, implies the construction of conditions of possibility of harm to a governance object. This means implementing a plan of action which enhances the resilience of a referent object by means of precautionary measures (Corry 2012: 249). In this context, the legitimation of measures that address high uncertainty is communicated and accepted by the audience. A relevant illustration is the measures taken during the COVID-19 pandemic, such as lockdowns, use of obligatory masks, etc. In general, these measures were serious interventions but transparent and openly communicated by the authorities to the public and, thereby, perceived as legitimate.

To sum up, riskification foresees long-term precautionary governance rather than exceptional short-term measures, considering risks in terms of probabilities, prevention, future scenarios and management, rather than defense and deterrence. The role of actors is to protect the referent object, as well as to "highlight the reality of the logic of risk as applicable to the referent object" (Odeyemi 2021: 83).

2.2. *Risk governance*

The scientific output on risk governance is vast and varied. Due to space constraints, we have focused on the main characteristics of risk governance as one of the core pillars of risk science.

Risk science has become an encompassing label to include the vast amount of knowledge produced to study risk, risk assessment, risk perception, risk management, risk communication, and risk governance from both a theoretical and a practical stance (see Aven 2020, Aven and Thekdi 2022). Risk governance concerns the translation of the substance and core principles of governance to the context of risk-related decision-making around a particular set of uncertain, complex, and/or ambiguous issues within a complex, interacting set of actors, organizations, and ideas (van Asselt and Renn 2011). Risk and risk-related decision-making comprise processes of risk assessment, risk appraisal, evaluation, management, and communication within public and private stakeholders (IRGC 2005). Risk governance is per se transdisciplinary, since it moves into the tradition of regulatory sciences, policy analysis, risk assessment and management. Risk governance combines governance and risk. The broader concept of governance is an encompassing label that explains how policy making works and is organized, which actors are involved in taking decisions, how public authorities steer a country, and which interactions occur between public and private stakeholders (see Kooiman 2003, Rhodes 1997).

A well accepted definition of risk is: "… an uncertain consequence of an event or activity with respect to something that humans value" (Aven 2010: 626). In older definitions, probability was a central concept, while this definition emphasizes uncertainty. Indeed, according to Aven and Krohn (2014: 1), "probability is just one tool for describing uncertainty and the concept of risk should not be limited to this tool". The concept of risk is about the future: probability and possibility concern an event not yet happening (see Tierney 2014).

The question is whether the above definition subsumes a realistic (risk exists in itself) or constructivist (risk is socially interpreted, individually or in groups) understanding of risk. In a realistic stance, "risk exists independent of our perceptions and of our knowledge claims, subjective judgments, about what is at risk and how likely a risk will be realized" (Rosa 1998: 32). In a constructivist stance, risk is a mental construction, not a real phenomenon but the result of our perceptions and/or interpretations, which

influence how we evaluate risks (Renn 2008). Renn points out that risks can be categorized according to simplicity, complexity, uncertainty, and ambiguity. A simple risk has an accepted and clear interpretation, there is a general acknowledgement about the risk, the uncertainty is low, and its potential negative consequences are obvious. A complex risk makes the identification of causal factors difficult, along with the establishment of cause-effect mechanisms to spot which negative effects need to be handled. An uncertain risk deals with knowledge-related challenges, such as lack of knowledge or poor knowledge. Knowledge is crucial to be able to calculate the probabilities and consequences of a risk. Finally, an ambiguous risk stems from different understandings and interpretations about the same risk. We can distinguish between interpretative and normative ambiguity: the first means that evidence of risk is controversial; the latter concerns controversies about values. Different legitimate viewpoints exist, in addition to tradeoffs between different choices on how to cope with the risk. Risk governance addresses the ambiguity of risk by providing a common ground for characterizing and qualifying evidence and values.

3. Interfaces between risk logic, riskification and risk governance

In this section, we present the risk logic linkages between riskification and risk governance. These linkages have been established within three broad categories that assume analytical purposes when applied in the study of empirical phenomena: the understanding of risk; the understanding of actors and their production of knowledge; the understanding of tools and practices.

3.1. *Riskification*

3.1.1. *Risk: the constructivist perspective*

Above, we have confirmed that riskification follows a social construction of risk and how risk is related to uncertainty, pre-emption, and prevention. The constructivists ask how risk is understood in different social and cultural contexts. The key question is what the relationship between risk and the social structures and processes that characterize societies consists of. A further question is why some threats are transformed or labelled as risks and others are not. Hence, the main issue is to reveal how risks are situated and contextualized. In riskification, risks are "the constitutive causes of harm" (Corry 2012: 246) and, to understand them, we need to explore dependencies and vulnerabilities, to reduce the chances of possible future harm.

3.1.2. *Actors and production of knowledge on risk*

One of the first authors to use the term 'riskification' was Heller (2002), who is one of the few to address the role of actors. According to Heller (Heller 2002: 9), actors are those who 'talk' about risks "as the most suitable frame for discussing arenas…". Corry does not identify riskifying actors, but one can assume that the context of riskifying actors is discourses and practices around risk. They are concerned how risk is a part of governmental strategies and embedded in institutional assemblages and structures. These actors are in charge of defining plans of action to increase the governance and resilience of referent objects, and they are also in a position of power to legitimate precautionary measures and policies in situations of extraordinary events (Corry 2012: 249).

Knowledge in riskification is produced through actors' interaction with science and practice and in the discourses about how threats can be transformed into risks. Knowledge related to riskification is never fully objective or noble outside belief systems and moral positions. The measurements and the identification of risks are constituted by preexisting knowledge and discourses. In contrast to realism, this means that the risk assessor is not an objective entity or independent but guided by mental models, intellectual background, and intersubjective beliefs that exist in the scientific communities of risk researchers. In addition, these communities relate to broader institutional and political arrangements, which constitute meanings, ideologies, and politics, shaping and influencing perceptions and the understanding of risks.

3.1.3. *Tools and practices*

Corry (2012: 248) argues that riskification tends to lead to "programmes for permanent changes aimed at reducing vulnerability and boosting governance-capacity of the valued referent object

itself". This aim is achieved through tools and practices like resilience, preparedness, and adaptation measures. Prevention, governance, and the establishment of possible future scenarios are also employed in riskification, to govern risks. In this context, the precautionary principle guides the legitimization of these tools and practices (Corry 2012: 249), while longer-term social engineering becomes a governmental policy sustaining them (Corry 2012: 245). This policy is not explicitly explained in Corry's article, but he makes clear reference to the risk management tradition, within which emergency measures (typical of securitization) are no longer necessary, since long-term solutions are proposed to minimize and govern the risk.

3.2. *Risk governance*

3.2.1. *Risk: the realist perspective*

Risk governance follows a realist approach to risk and how risk is related to uncertainty. The key question is what kind of risks exist and how to measure them. Realists focus on how we may gain information about risks in an effective way and develop methods that, in the best possible way, can unveil the realities. This means to develop appropriate quantitative and qualitative measures of uncertainty, as the above mentioned Aven and Krohn (2014) argue. Risk governance underlines that not all risks can be calculated as a function of probability and effect (van Asselt and Renn 2011). Societal choices and decisions need to take into account that several risks are to be adequately characterized as complex, uncertain and/or ambiguous, although this is still an issue of measurement, which places risk governance in the realist field.

3.2.2. *Actors and production of knowledge on risk*

In risk governance, actors are risk managers, scientists and policy makers, dealing with specific risks to enhance societal resilience (Aven 2020; Renn 2008). Governments, public institutions, private agencies, and industry organizations are all examples of risk governance actors. They are legitimized to handle risks. However, a major policy challenge for risk governance is to bring together local, national, and supra-national actors, private as well as public, in arrangements that can cope with the complexity of risks. This is not just inclusion *per se* but serves the purpose of framing risks (IRGC 2005, Renn 2008). Actors in risk governance deal with risk-related decision-making and processes of risk assessment, risk appraisal, evaluation, management, and communication (IRGC 2005).

Knowledge in risk governance is produced by providing the best possible methods to categorize, assess, and measure risks and to develop strategies and plans to cope with risks. Scientific knowledge plays a key role in risk governance. All relevant knowledge from various disciplines is needed, to seek to provide solutions to complex risk problems. Strengthening the knowledge about an unwanted event and its consequences reduces uncertainty (Aven 2020). Knowledge is a challenging endeavor in risk governance. According to van Asselt and Renn (2011), knowledge interactions should be inclusive and meaningful for a vast number of actors: stakeholders, experts, policymakers, and the general public. Trust and social support are crucial for the responsible governing of uncertain, complex, and/or ambiguous risks. However, this is not always the case.

3.2.3. *Tools and practices*

Risk governance applies tools and practices based on risk and its management; risk appraisal, risk (and vulnerability) analyses, risk assessment, risk evaluation, risk management, and risk communication are all used in risk governance to make estimations about risks (IRGC 2005). These tools and practices identify risk factors, seek to mitigate them, and calculate risk probability by supporting the overall aim of risk governance to govern potential harms. They are often routinized and institutionalized in structures and policy processes. In this context, these tools and practices, including the decision-making, are guided by the precautionary principle.

4. Discussion

We argue that deliberative processes in risk governance interweave riskification, in terms of perceptions, assessments, knowledge and, thereby, how to categorize risks and develop relevant risk descriptions. This means that, eventually, the construction of risks becomes a question of how to place risk into 'operational' risk management categories, such as uncertainty,

ambiguity, and complexity. Furthermore, this *intertwineness* allows a governance strategy to be developed, in which different risk perceptions are tried out and several actors discuss their way to find a solution through debate and dialogue.

Risk governance prescribes an active strategy to uncover, analyze, and evaluate risks and then decide whether risks are perceived as acceptable, tolerable, or intolerable. In this sense, risk governance's models set the basis for the technical risk analysis, as well as political decision-making and implementation. Risk governance's deliberation means weighing and exploring all sides – facts and arguments – against each other through open and critical debate, within which the participants in the discussion can reach satisfactory solutions. Thus, empirically, it is reasonable to claim that this is the same processes that Corry denotes performative effects, i.e., legitimation of precautionary measures and concerning normal governance as the "legitimation of trade-offs in relation to other goods" (Corry 2012: 249).

The pathway from realist to constructivist ontology is embedded in how risk governance relates to normative politics. The challenge in risk governance is how to acquire knowledge about the various risk typologies at individual, organizational, and societal levels and, thereby, find out whether risks should be accepted, reduced, or removed for the sake of societal safety and security. In risk governance, this is achieved through an increasing degree of participation. If risks can be considered simple, the decision-making process will be largely instrumental and neutral when it comes to value judgements and where the aim is to reveal how risks are to be handled in the most cost-effective way.

As complexity increases, simple expert judgments will no longer be sufficient. Complexity requires a better knowledge base and more advanced theories and methods to uncover risks. Therefore, one must involve a larger number of experts and competences or views of knowledge, to achieve the most comprehensive analysis possible. At the same time, when uncertainty increases, an increasing number of members of the general public will doubt whether the expert knowledge is sufficient and whether there is only one truth related to the existence and consequence of risks. Here, one will experience different views of knowledge possibly coming into conflict with each other and the expert knowledge no longer being sufficient to convince all stakeholders whether the risk is acceptable, tolerable or intolerable. According to risk governance, several of the relevant stakeholders must be included in the decision-making process to produce more views of knowledge. The aim is to uncover the controversies between the views of knowledge and then to search for directions for risk-reducing measures, different preparedness principles, and whether it is possible to decide whether risks should be reduced or not.

In addition, when the risks are characterized by ambiguity, the demand for democratic procedures could be even stronger. In such risk decisions, risk governance shows that the involvement of all existing stakeholders and relevant institutions is necessary in public discourse. In practice, this means parliamentary proceedings, consultation rounds, consensus conferences, and so on. The general public will thus play the role of a corrective and coordinating body, regarding the experts involved, interest organizations, business, and politicians. This is what we mean by deliberation in practice, and this is what risk governance models propose: to find solutions to cope with extensive systemic risks.

Each time uncertainty and ambiguity are high, riskification overlaps with risk governance. In risk governance, risks are defined, conceptualized, and discussed in theoretical and practical terms. Risk, as a theoretical concept, constitutes the foundation of risk analysis and risk governance. The theoretical discussion on risks is the basis for selecting political measures and framing a risk governance strategy to reduce future vulnerabilities. This recalls riskification measures such as "programmes for permanent changes aimed at reducing vulnerability and boosting governance-capacity of the valued referent object itself" (Corry 2012: 248). The intersection between risk governance and riskification becomes therefore evident in practice when developing state guidelines, laws, and regulations, modes of cooperation, collaboration, short- and long-term measures – all kinds of processes which need to be cross-sectoral.

Risk governance is based on several areas of knowledge related to risk and risk management. Risk governance sustains a construction of communication that works across disciplines, social groups, and institutions. In other words, it

is possible to establish general risk management strategies that not only arise within individual companies and in certain technological systems, but which are global and complex. Advocates for risk governance show a clear belief in the use of technical risk analysis, probability models, and the development of resilient and robust models. This also underlines the realist perspective: to gain knowledge, it is important to use the best theories and methods and the best experts. On the other hand, risk governance accepts the challenge that the experts do not always agree, and that one must, therefore, establish knowledge discussions and reflexive processes that enable the professional communities to examine theories and methods' application with the affected parties.

Accordingly, such arrangements could be considered part of an administrative governance structure and/or part of a *dispositif* which disciplines the general public and organizes society. According to a riskification perspective, trust-based relationships can be established between those in power and the general public, or, following a risk governance discourse, between experts' systems and social systems. However, this could materialize in power unbalances, conflicts of interest, and obscure deliberative processes.

At this stage, we reach a point where risk governance slightly differs from riskification and where the realistic and normative differ from the constructivist. In risk governance, the main objective is to think what conditions are needed to manage risks that are complex, uncertain, and ambiguous. In addition, risk governance focuses on how to avoid processes ending up in conflict and power struggles, within which no one enjoys clear advantages. Riskification opens the door for a qualitative analysis of the relationship between experts and the general public, regarding knowledge of risks, and unveils the power and power structures that exist between public institutions and the general public.

The table below sums up our main arguments about *interfaces* between riskification and risk governance.

Table 1. Summary riskification and risk governance: main features.

	Riskification	*Risk governance*
Risk	Socially constructed	Realist approach
Actors	Discursive actors	Rational actors
Tools and practices	Resilience, preparedness, adaptation, prevention, governance, establishment of possible future scenarios following the precautionary principle	Risk appraisal, risk (and vulnerability) analysis, risk assessment, risk evaluation, risk management, and risk communication the precautionary principle
Interfaces	Provides qualitative analysis of the relationship between experts and public regarding knowledge of risks and unveils power and power structures	Provides normative perspectives regarding risk, combined with a deliberative view of politics

5. Conclusion

In this paper, we have tried to address some epistemological and ontological issues around riskification and risk governance. We have proposed the extent to which riskification and risk governance can be linked together according to three broad empirical categories: risk understanding, actors involved, and tools applied. The main outcome of this reflection is to provide a foundation for empirical research concerning risk challenges associated with complex societal phenomena, such as climate change. We believe that there are empirical fields that can benefit from our study, particularly fields within which risks are characterized as uncertain, complex, ambiguous and systemic.

We propose exploring these complex societal phenomena according to two avenues of research: on the one side, risk governance

provides an analysis for decision-makers on risk descriptions and arguments for certain risk management strategies, while riskification can provide additional analyses on how risks are embedded in power relations of different interest groups and can be affected by conflicts and power struggles among these groups. On the other side, by approaching risk from both a realist and a constructivist perspective, we include social, cultural, and political arguments in our analyses and, therefore, can better explain which risks are prioritized, which actor constellations deal with these risks, and which political decisions need to be made.

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References

Aradau, C. and R. Van Munster (2007). Governing terrorism through risk: Taking precautions, (un)knowing the future. *European Journal of International Relations 13(1)*, 89-115.

Aven, T. (2020). *The Science of Risk Analysis: Foundation and Practice*. Routledge: Abingdon.

Aven, T. (2010). On how to define, understand and describe risk. *Reliability Engineering and System Safety 95*, 623-631.

Aven, T. and B.S. Krohn (2014). A new perspective on how to understand, assess and manage risk and the unforeseen. *Reliability Engineering and System Safety 121*, 1-10.

Aven, T. and S. Thekdi (2022). *Risk Science. An Introduction*. Routledge: London.

Balzacq, T., S. Léonard, and J. Ruzicka (2016). 'Securitization' revisited: theory and cases. *International Relations 30(4)*, 494-531. doi:10.1177/0047117815596590.

Balzacq, T. (2010). *Securitization Theory: How Security Problems Emerge and Dissolve*. Routledge: London.

Bengtsson L., S. Borg, and M. Rhinard (2019). Assembling European health security. *Security Dialogue 50(2)*, 115-130.

Bigo, D. and A. Tsoukala (2008). Understanding (In)Security. In D. Bigo and A. Tsoukala (Eds.), *Terror, Insecurity and Liberty: Illiberal Practices of Liberal Regimes After 9/11*, pp. 1-9. Routledge: London.

Buzan, B. and O. Wæver (2003). *Regions and Powers*. Cambridge University Press: Cambridge.

Buzan, B., O. Wæver, and J. De Wilde (1998). *Security: A New Framework for Analysis*. Lynne Rienner: Boulder.

Corry, O. (2012). Securitization and "riskification": Second-order security and the politics of climate change. *Millennium: Journal of International Studies 40(2)*, 235-58.

Diez, T., F. Von Lucke, and Z. Wellmann (2016). *The Securitisation of Climate Change: Actors, Processes and Consequences*. Routledge: New York.

Heller, C. (2002). From scientific risk to paysan savoir-faire: Peasant expertise in the French and global debate over GM crops. *Science as Culture 11*, 5-37.

IRGC (International Risk Governance Council) (2005). Risk Governance: Towards an Integrative Approach. White Paper No. 1. IRGC: Geneva.

Kooiman, J. (2003). *Governing as Governance*. Sage: London.

Müller, M. (2015). Assemblages and actor-networks: rethinking socio-material power. *Geography Compass 9(1)*, 27-41.

Odeyemi, C. (2021). Conceptualising climate-riskification for analysing climate security. *International Social Science Journal 71(239-240)*, 77-99, https://doi.org/10.1111/issj.12270.

Petersen, K.L. (2016). Risk and Security, in M. Dunn Cavelty and T. Balzacq (Eds.), *Routledge Handbook on Security Studies*. Routledge: London.

Petersen, K.L. (2008). Terrorism: When risk meets security. *Alternatives 33(2)*, 173-190.

Rasmussen, M.V. (2006). *The Risk Society at War: Terror, Technology and Strategy in the Twenty-First Century*. Cambridge University Press: Cambridge.

Renn, O. (2008). *Risk Governance: Coping with Uncertainty in a Complex World*. Earthscan: London.

Rhodes, R.A.W. (1997). *Understanding Governance: Policy Networks, Governance, Reflexivity and Accountability*. Open University Press: Buckingham.

Rosa, E.A. (1998). Metatheoretical foundations for post-normal risk. *Journal of Risk Research 1(1)*, 15-44, DOI: 10.1080/136698798377303.

Tierney, K.J. (2014). *The Social Roots of Risk: Producing Disasters, Promoting Resilience*. Stanford Business Books: Stanford.

van Asselt, M.B.A. and O. Renn (2011). Risk governance. *Journal of Risk Research 14(4)*, 431-449.

Williams, M.J. (2008). (In)Security studies, reflexive modernization and the risk society. *Cooperation and Conflict 43(1)*, 57-79.