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A REVIEW ON SOCIOECONOMIC IMPACT OF DAM-FAILURE FLOOD RISK AND SENDAI FRAMEWORK EFFECTIVENESS: ANALYSIS AND GAPS

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ABSTRACT:
Dam failures leading to floods pose a global threat to communities, prompting a closer look at their socioeconomic effects. This review explores how well the Sendai Framework for Disaster Risk Reduction (SFDRR 2015-2030) has been integrated into previous research as a key guideline. Existing research and practical efforts have identified gaps, particularly in understanding the correlation between dam failure and socioeconomic impact towards SFDRR effectiveness as a functional blueprint for risk mitigation. To address this gap, the present study strategically explores previous research on the role of the SFDRR in guiding the community regarding socioeconomic impact assessment. Using the content analysis method, the authors systematically analyze and evaluate the findings of scholarly articles by synthesizing past contributions and highlighting the gaps regarding SFDRR's influence towards socioeconomic impact elements. As efforts continue to enhance the effectiveness of the SFDRR, addressing these challenges becomes imperative for achieving a more comprehensive and resilient approach to disaster risk reduction. This is a critical aspect for informing policy decisions and allocating resources for effective response and prevention measures in future.
KEYWORDS: Dam failure, flood risk, Socioeconomic impact, SFDRR, disaster risk preparedness, and community at-risk.

1) INTRODUCTION:

The socioeconomic impact of dam-failure flood risk poses significant challenges to communities worldwide, necessitating a comprehensive evaluation of the effectiveness of frameworks i.e the Sendai Framework for Disaster Risk Reduction. Dam failures can result in catastrophic flooding, leading to loss of lives, displacement of populations, and extensive damage to infrastructure and livelihoods. In 2015, the Sendai Framework was adopted to aim to reduce disaster risk and build resilience. However, a critical analysis reveals certain gaps in its implementation concerning dam failures. A dam failure poses a dual threat to communities, with both monetary and non-monetary ramifications. The ensuing floods can result in substantial economic losses, including the destruction of infrastructure, leading to high repair costs and insurance payouts. Simultaneously, the loss of human lives, displacement, and trauma inflicts profound non-monetary impacts, causing long-term social disruption and environmental degradation. This synthesis underscores the necessity of comprehensive risk management that recognizes the interconnected nature of financial and societal consequences, emphasizing the importance of addressing both aspects for effective community resilience. Closing these gaps will contribute for more resilient and sustainable approach to mitigate the socioeconomic impact of dam failure flood risks.

2) METHODS AND METHODOLOGY:

In this article, the author employs content analysis to track top-tier journal articles spanning from 2016 to 2024, focusing on the relevance of topics using keywords such as “Socioeconomic Impact”, "Sendai framework," "disaster risk reduction” community preparedness," and "dam failure flood risk." The objective is to synthesize

the interlinkages among these elements and identify any existing gaps. Discrepancies are highlighted to underscore the significance of current research as a valuable contribution to the literature on disaster risk preparedness awareness within communities, specifically in the context of dam-failure flood risk. This study proposed content analysis a research method, which its offers several advantages that make it as valuable tool in a variety of fields with this main five key benefits:

a) Flexibility in Data Sources:
Text, photos, audio, and video are just a few of the many data kinds that can be included in content analysis. This flexibility allows researchers to analyze diverse materials such as interview transcripts, social media posts, news articles, and historical documents. The method is adaptable to both qualitative and quantitative research approaches, making it suitable for a variety of research goals.

b) Systematic And Objective Analysis:
Content analysis provides a structured framework for data analysis. By using predefined categories and coding schemes, researchers can systematically and objectively identify patterns, themes, and trends within the data. This structured approach increases the reliability and validity of findings and reduces the risk of researcher bias.

c) Ability To Handle Large Amounts of Data:
Content analysis is particularly effective at handling large data sets. Whether through manual coding or the use of software tools, researchers can efficiently analyze large amounts of data. This ability is especially useful for studies involving large amounts of data, such as analyzing social media trends or media content over time.

d) Uncover Hidden Meaning and Insights:
Qualitative content analysis allows researchers to delve deeper into the underlying meanings and contexts within the data. Through the identification of subtle themes, correlations, and patterns, content analysis can provide insights that other research approaches might not be able to provide right away. This is particularly valuable for understanding complex social phenomena, cultural practices, and communication strategies.

e) Non-Intrusive Research Method:
Content analysis serves as a non-intrusive approach, focusing on the examination of pre-existing data instead of engaging directly with participants. This characteristic renders it an ethical option for investigating sensitive issues or vulnerable groups, where direct inquiries or observations could potentially alter participants' behavior or pose ethical dilemmas. Furthermore, it facilitates the exploration of historical and archived information, offering valuable insights into trends and transformations over time. These benefits position content analysis as a flexible and effective research tool, empowering researchers to address a diverse array of questions across various fields and contexts.

3) RESULTS & DISCUSSION (ANALYSIS AND GAPS):

Table I provides a consolidated overview of ten (10) influential research papers exploring the connections among the SFDRR, Socioeconomic impacts, disaster risk, dam failure flood risk, and the communities at risk. These papers systematically investigate the interactions between these essential components, offering valuable insights and identifying gaps in the current literature. The findings reveal that while the Sendai Framework has significantly advanced the adoption of a risk-informed approach to disaster management, there remains a noticeable gap in adequately addressing the complex socioeconomic dimensions of disasters. To address this, the study comprehensively analyzed all relevant publications since the establishment of the Sendai Framework in 2015, focusing on how the framework has influenced researchers' awareness and contributed to meaningful improvements in understanding the socioeconomic impacts of dam-failure flood risk. The study underscores the framework's role in driving critical discourse and research aimed at enhancing the effectiveness of disaster risk reduction strategies, particularly in mitigating the socioeconomic consequences of dam failures. Moving forward, the findings indicate that while the Sendai Framework has made strides in promoting a risk-informed approach, there is a discernible gap in addressing the nuanced socioeconomic dimensions of disasters. Research underscores the differential impact on various socioeconomic strata within communities, emphasizing the necessity of targeted interventions to enhance overall resilience.

Table 1. Table showing the association between Socioeconomic, Sendai Framework, disaster preparedness

No.	Title	Author, Year	Analysis	Gaps
1	A Decade of Inaction in the SADC region? - disaster risk data gaps and inconsistencies	Khoza S, van Niekerk D, Nemakonde LD, 2022 [1]	This study looked at disaster risk statistics from the United Nations Statistics Division database for the 2030 Agenda for Sustainable Development and the Sendai Framework Monitor (SFM), two important databases utilised for official progress reporting. The results show that the Southern African Development Community (SADC) region has a serious	The socioeconomic effects of dam failure flood risk and the efficacy of the Sendai Framework are not discussed in detail in the report. Rather, it focusses

	on the Sendai Framework Monitor		reporting gap on the target. In particular, there has been little progress, as indicated by less than 50% of SADC nations on the adoption and application of national Disaster Risk Reduction (DRR) policies. The data's relevance for well-informed development decision-making was limited by the study's identification of significant gaps and inconsistencies. Weak coordination and integration amongst government agencies in charge of data gathering and reporting are among the flaws. The SADC countries must increase their investment in disaster risk data collecting and information management in order to address these problems. Given the significance of disaster risk data in directing sustainable development, it is essential that this data be incorporated into decision-making procedures meant to lower the region's risk of disasters.	on pinpointing inadequacies in the Southern African Development Community (SADC) region's disaster risk data reporting and gathering. The report identifies particular issues that impede the effective application of risk data in Southern Africa's development decision-making, including data shortages and inconsistencies.
2	The economics of dams	Marc J, 2020 [2]	Because they reduce water fluctuation, support a variety of uses, allow power generation, improve recreation, and guard against flooding, dams are essential to civilisation. Dams are controversial despite their many advantages because of their high prices, uneven distributional effects, and potential harm to rivers and ecosystems. The economic justification for dam developments is examined in this essay, along with its benefits and effects. We recognise that dam interventions are inherently heterogeneous across situations, making it difficult to make broad judgements about their social worth. Evidence indicates that increasing surface water storage may not always be the best course of action, even if dams are seen to be a solution to water scarcity. It is challenging to precisely identify the most appealing projects due to the biases and blind spots introduced by the complexity of dam projects into economic frameworks utilised for evaluation. Surprisingly, policymakers appear to use economic analyses less often when making decisions about dams, maybe because they believe these methods are lacking. Economists must improve the realism and methodologies in their studies of dam value in order to prevent expensive errors in future dam construction and removal. This entails addressing the difficulties brought on by the particular traits and effects of dam projects as well as offering more insightful interpretations of the findings.	The paper doesn't discuss the socioeconomic impact of dam-failure flood risk or the effectiveness of the Sendai Framework. Instead, it concentrates on the economic rationale for dams and the challenges associated with assessing their social value. The inherent heterogeneity across contexts makes it challenging to draw general conclusions. Surprisingly, policymakers underutilize economic analyses in decision-making about dams. Biases and blind spots in economic frameworks further complicate accurate project evaluation, posing a challenge that needs improvement for better decision-making in the future.
3	Appraisal of gaps and challenges in Sendai Framework for Disaster Risk Reduction priority 1 through the lens of science, technology and innovation	Rahman AU, Fang C, 2019 [3]	In order to connect with the UN Sustainable Development Goals (SDGs), which were unveiled in September 2015, the UN adopted the Sendai Framework for Disaster Risk Reduction (SFDRR) in March 2015, highlighting a change from disaster management to disaster risk management. Together with partner organisations, the UNISDR presented a plan in 2016 for integrating science and technology into the SFDRR. This essay examines the difficulties in achieving SFDRR's top goal, which is to employ science, technology, and innovation to comprehend disaster risk. The analysis emphasises that the integration of remotely sensed data, real-time digital data, evidence-based digital and social data, and the application of geo-information tools are necessary to understand different aspects of multi-hazards, spatial exposure, and risk knowledge. It highlights the necessity of providing researchers with unrestricted access to high-resolution geographical data and sophisticated computer-based programs. In order to effectively reduce disaster risk, the study also recommends boosting investment in research and development, integrating knowledge management for DRR, enhancing capacity building, and including Disaster	The paper does not touch upon the socioeconomic consequences of dam-failure flood risk or the efficacy of the Sendai Framework. Instead, it centers on the obstacles and deficiencies in comprehending disaster risk within the framework. It underscores the necessity for high-resolution spatial data and sophisticated computer tools, emphasizing the call for elevated investments in research and development as well as capacity building to diminish disaster risk.

			Risk Reduction (DRR) specialists in policymaking. Fundamentally, a thorough understanding of disaster risk—including susceptibility, coping ability, exposure, hazard nature, and environmental settings—should serve as the foundation for the development of policies and procedures for disaster risk management.	
4	Socio-Economic Impact Assessment of Small Dams Based on T-Paired Sample Test Using SPSS Software	Bhatti NB, Siyal AA, Qureshi AL, Bhatti IA, 2019 [4]	With a particular focus on the Nagarparkar region of Sindh, Pakistan, the study evaluates the socioeconomic effects of small dams on nearby populations. The analysis used t-paired sample tests and descriptive statistics with SPSS software. 250 persons participated in interviews and group discussions to gather main and secondary data, while 104 sets of data were gathered via a questionnaire survey. The main conclusions show that the study area has changed for the better since the dam was built. Notably, the water depth and pack a house quantity both increased. Water collection time and distance dropped by 5.61% and 6%, respectively. The area under crop cultivation increased by a significant 26.55%. Areas around the dams experienced a notable 55% increase in crop production during both the Rabi and Kharif seasons. With a 1.5% drop in horses excluded, livestock numbers rose by 18.08%. Furthermore, after the completion of the dam, migration rates fell by 19.09%, but income, spending, and savings all saw notable increases of 36.16%, 17.68%, and 32.15%, respectively. The selection of crops changed from subpar to exceptional and focused on the market. Along with well recharge, there were also improvements in the water level and quality.	The study focusses on assessing the socioeconomic effects of minor dams, particularly in Pakistan's Nagarparkar region of Sindh. It doesn't examine the socioeconomic effects of flood risk caused by dam failure or evaluate the Sendai Framework's efficacy. The main goal is to demonstrate how modest dams improve the socioeconomic standing of nearby communities.
5	Mapping the social impacts of small dams: The case of Thailand's Ing River basin	Fung Z, Pomun T, Charles KJ, Kirchherr J , 2019 [5]	Although a lot of study has been done on the social effects of major dams, this paper attempts to fill in a significant knowledge vacuum about the social effects of small dams. We studied several tiny dams in Thailand's Ing River watershed, looking at the social effects they had on one hamlet upstream and one downstream. Semi-structured interviews with NGOs, government officials, and beneficiaries revealed that tiny dams have a variety of uneven social effects. The dams were thought to have both beneficial and negative impacts, decreasing fish populations but also lowering floods. They also made it easier for upstream farmers to obtain more irrigation water, which resulted in water reappropriation at the expense of downstream people and conflicts over water allocation. Although some people say that tiny dams are a safer option than huge dams, our research suggests that this claim should not be taken at at its entirety.	The effectiveness of the Sendai Framework and the economic effects of flood risks associated with dams are not examined in this paper. Instead, by focussing on the social effects of minor dams, it closes a study gap. The study specifically examines many small dams in the Ing River basin of Thailand, highlighting their varied and uneven social impacts. Changes in fish populations, the benefits of flood mitigation, changes in irrigation water availability, and the ensuing disputes over water distribution between upstream and downstream towns are all noted in the study.
6	The socio-economic impacts of dam construction: a case of tokwe mukosi in masvingo province, zimbabwe	Chazireni E, Chigonda T, 2018 [6]	Through key informant interviews and a questionnaire survey, the study examines the socioeconomic effects of the construction of the Tokwe Mukosi Dam on neighbouring communities. Results show both beneficial and detrimental effects. More fish availability, water supply for home use, livestock, and irrigation, as well as the growth of tourism and the resulting financial gains, are all positive elements. Negative effects, however, include drowning deaths, assaults by crocodiles on humans and animals, eviction of communities, and increased prevalence of vector-borne and	The socioeconomic effects of dam construction in Tokwe Mukosi, Zimbabwe, are specifically discussed in the report. It does not, however, examine the issues of flood risk from dam failure or assess the efficacy of the Sendai Framework.

			water-borne illnesses. Some suggestions to lessen negative impacts and increase positive ones include raising awareness to prevent drowning and crocodile attacks, implementing healthcare interventions to prevent disease, working together to develop local tourism, providing aquaculture training to increase the benefits of fish resources, and creating an Integrated Environmental Management Plan for the sustainable use and preservation of the dam and its resources.	
7	The socio-economics dynamics of Dam on Rural Communities: A case study of Oyan Dam, Nigeria	Ayeni A, Ojifo L, 2018 [7]	This study examines the Oyan Dam's potential and socioeconomic dynamics from 1980 to 2016, taking into account both the advantages and disadvantages of dam building and operation. Water level and discharge data from 2007 to 2016, Landsat imagery from 1984 and 2016, and socioeconomic data from the same time period are among the data used. The study uses land-use change analysis, basic statistical methods, questionnaires, organised interviews with key stakeholders, and personal observations to evaluate the dam's potentials (water supply, agriculture, and electricity) and socioeconomic implications. The results show a non-stationary pattern in water abstraction and production, as well as a relative 2% decrease in the Oyan Dam's water level and storage. The extent of land-use classes is declining, with the exception of cultivated land, which grew by 19.9% between 1984 and 2016. While the irrigation network remained underutilised from its start in 1983 to 2016, the commercial water supply varied dramatically between 2010 and 2016. The bulk of the chosen community members do not profit from the dam, according to socioeconomic impact assessments, and it has no direct effect on their means of subsistence.	The paper doesn't explore the socioeconomic impact of dam-failure flood risk or assess the effectiveness of the Sendai Framework. Instead, it concentrates on the socio-economic dynamics of the Oyan Dam in Nigeria. Communities are anticipating more in terms of employment, compensation, and relocation. Dam operations have led to downstream flooding and conflicts.
8	The Social Impacts of Dams on Rural Areas: A Case Study of Solaiman Shah Dam, Kermanshah, Iran	Malek Hosayni A, Mirakzadeh AA, Lioutas E, 2017 [8]	Using the Social Impact Assessment technique, this study evaluated the social effects of the Solaiman Shah Dam in Kermanshah, Iran, on the nearby communities. This study classified and assessed ten impacts using a qualitative research design, examining the relationships between them. The results show that the dam's construction has resulted in new economic prospects and infrastructure growth, creating a feeling of wealth known as the promise-land effect. Societal capital, societal cohesiveness, and migration rates have all benefited from this. Even while most inhabitants' subjective well-being has improved generally, there have been complaints about an unequal distribution of dam benefits, which has complicated relations between nearby villages, disrupted cultural norms, and forced some peasants to relocate. The project's social sustainability is at jeopardy because of these issues. In conclusion, even though the Solaiman Shah Dam has improved the subjective well-being of the local population, improved the economic status of the area, and encouraged new kinds of collaboration among inhabitants, it has also raised issues of justice and social unrest that must be carefully taken into account for the project's long-term viability.	The paper does not explore the socioeconomic repercussions of dam-failure flood risk or evaluate the effectiveness of the Sendai Framework. Instead, it centers on the social impacts of Iran's Solaiman Shah Dam. Challenges arise due to an inequitable distribution of dam benefits, leading to objections and cultural disruptions. The mandatory resettlement of certain peasants poses a considerable threat to the project's social sustainability.
9	Cleaning Up the Big Muddy: A Meta-Synthesis of the Research on the Social Impact of Dams	Kirchherr J, Pohlner H, Charles KJ, 2016 [9]	For more than fifty years, researchers have been examining the social effects of dams; nevertheless, the absence of systematic techniques has resulted in many gaps in the current body of knowledge. The first comprehensive evaluation of the research on the social effects of dams is presented in this paper in order to address this problem. Using bibliography reviews, expert consultations, and key word searches, the study selected a sample of 217 publications published within the previous 25 years. An aggregate matrix framework that included 27 previous	The paper doesn't delve into the socioeconomic impact of dam-failure flood risk or assess the effectiveness of the Sendai Framework. Instead, it focuses on the social impacts of dams and highlights biases in current literature. The main

			frameworks on the social impact of dams was used to evaluate all of the publications. The results highlight significant biases in the literature, such as a preponderance of negative viewpoints (45% negative versus 5% positive), an over-representation of large dams in the studies, a restricted temporal scope (5–10 years post-resettlement), and a narrow spatial focus primarily on resettlement areas. Additionally, there is a bias in whose opinions are taken into account, with experts paying little attention to the viewpoints of dam developers. Future studies should fill up these gaps to improve our knowledge of the social effects of dams and encourage openness in decisions about dam construction.	takeaway is the need for more systematic approaches in studying these social impacts and the importance of addressing biases in existing research. This is crucial for promoting transparency in decision-making regarding dam development.
10	How can the Sendai framework be implemented for disaster risk reduction and sustainable development? A qualitative study in Iran	Nekoei-Moghadam M, Moradi SM, Tavan A, 2024	The study's main objective was to examine how the Sendai Framework was implemented in Iran between 2021 and 2023, especially from the standpoint of a developing nation. Through focus groups and interviews with nine more experts, the study used a qualitative direct content analysis approach to collect opinions from 35 experts. The results were combined into a single subject, "Executive Actions for Implementing the Sendai Framework," which was backed up by 37 distinct codes and four categories.. These codes were distributed across four key strategies outlined by the Sendai Framework: • Understanding Disaster Risk: Eleven codes were found to fall under this heading, emphasising how crucial it is to understand the particular dangers Iran faces. • Improving Disaster Risk Governance to Control Disaster Risk: This approach also produced 11 codes, highlighting the necessity of strong governance frameworks customised for Iran. • Investing in Disaster Risk Reduction for Resilience: This category had eight categories that addressed the distribution of resources to improve resilience to disasters. • Improving Disaster readiness for Efficient Reaction and Better Recovery, Rehabilitation, and Reconstruction: This plan identified seven codes that emphasise the importance of readiness and efficient recovery following disasters.	The study reveals critical gaps in current implementation efforts and provides targeted solutions to address them, thereby enhancing Iran's disaster risk management and resilience efforts. While the findings may offer valuable insights for other developing countries, the unique socio-political and economic conditions in each country could significantly limit the applicability of the strategies identified in this study. The solutions proposed are deeply rooted in Iran's specific context, which means they may not fully address the diverse challenges faced by other nations. Therefore, a one-size-fits-all approach might not be effective, and each country should adapt the strategies to their own unique circumstances and needs.

4) CONCLUSION:

In conclusion, the integration of the Sendai Framework into research on dam failure and its socioeconomic impacts reveals significant gaps that need to be addressed to enhance disaster risk reduction efforts. This study highlights the necessity of a more comprehensive approach that fully incorporates the SFDRR's guidelines into socioeconomic impact assessments. Strengthening this integration is crucial for improving policy decisions, resource allocation, and ultimately, building more resilient communities against the threats posed by dam failures. To address this shortfall, the present study strategically delves into past research to evaluate the role of the SFDRR in guiding communities on assessing socioeconomic impacts. By employing a content analysis methodology, the authors systematically analyze and synthesize findings from scholarly articles, shedding light on the overlooked areas where the SFDRR's influence on socioeconomic impact assessment remains limited. As efforts continue to refine and enhance the SFDRR's implementation, it becomes increasingly vital to address these challenges, ensuring a more integrated and resilient approach to disaster risk reduction. This focus is crucial for informing sound policy decisions, optimizing resource allocation, and ultimately bolstering the capacity for effective response and prevention measures in the face of future dam failure.

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