



Climate change and natural hazards in Bosnia and Herzegovina: a gender equality, social equity and poverty reduction lens

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Key messages

- Due to its geographical location, limited adaptive capacity and economic reliance on the agricultural and forestry sectors, Bosnia and Herzegovina (BiH) is particularly vulnerable to the impacts of climate change.
- Children, elders, disabled persons, migrants, war returnees and members of the Roma minority are particularly vulnerable to the impacts of climate change, because they are more likely to live in hazard-prone areas and often lack the information and resources needed to cope with these impacts.
- Gender can also affect vulnerability to the impacts of climate change and natural hazards, because of gender-based differences in time use (concerning housework, employment and caring activities), differentiated access to assets and credit, and limited access to policymaking spaces.
- Awareness-raising and capacity-building programmes targeting and tailored to disadvantaged groups can help increase their preparedness and adaptive capacity. At the same time, the involvement of disadvantaged groups in climate and disaster risk reduction policymaking is essential to develop policies that address their needs and harness their potential to help tackle climate change related issues.
- Climate mitigation and adaptation policies can have detrimental impacts on disadvantaged populations. It is therefore important to assess these implications and implement strategies to mitigate the detrimental effects of climate policy on these groups.

Introduction

Gender inequality and social inequity – understood in terms of access to and control over assets, decision-making and participation, and knowledge, which are all dimensions of poverty¹ – are deeply intertwined with environmental change (SEI, 2019). Socio-economic and political factors, such as education, income, political influence, access to legal resources, access to healthcare and adequate housing, affect people's exposure and vulnerability to environmental problems with socially disadvantaged² groups being disproportionately

affected (European Environment Agency, 2018; WHO, 2019). At the same time, solutions to environmental change are not socially neutral; they may benefit or disadvantage particular groups in society in different ways (Mackie and Hašič, 2018). Moreover, reducing poverty and strengthening social equity and gender equality can contribute to better environmental outcomes (UNDP, 2010; UNEP, 2017). Thus, it is essential to incorporate gender equality, social equity and poverty reduction considerations into environmental policy and vice versa.

¹ In this brief we rely on a multidimensional definition of poverty, which goes beyond income poverty and refers to the lack of resources, power, voice, opportunities and choice, and human security (Sida, 2017).

² Social disadvantage relates to “socio-economic aspects – such

as income, employment, education and socio-economic status – to sociocultural aspects such as gender, ethnicity, religion, culture, migrant status and social capital; to socio-geographical aspects such as living in a deprived neighbourhood; and to age. SDG [socially disadvantaged groups] may actually be affected by more than one of these dimensions” (WHO Regional Office for Europe, 2013, p. 2).

This discussion brief aims to inform and support the integration of these considerations into the development of the Bosnia and Herzegovina (BiH)^{3,4} Environmental Strategy and Action Plan and further environmental policy developments in BiH. The brief outlines the main relationships between climate change, gender inequality, social inequity and poverty in BiH. It summarizes the findings from a review of secondary literature and publicly available databases on the environment, health, natural resources, gender equality, social equity and poverty, with a particular focus on Europe and BiH. A broader introduction to the interlinkages between gender equality, social equity, poverty and environmental issues in BiH is available in the SEI policy report, “Strengthening environmental policy in BiH with a gender equality, social equity, and poverty reduction approach” (Strambo, Jahović and Segnestam, 2021).

The discussion brief examines both climate mitigation and adaptation while also discussing natural hazards more broadly. It proceeds in three parts. First, the brief describes the challenges of climate change and natural hazards in BiH. It then explains how and why gender inequality, social inequity and poverty contribute to climate change and natural disasters, and vice versa. Particular attention is given to the population subgroups that are especially vulnerable⁵ to the negative impacts of climate change and natural hazards. The final section explores how policy measures can best address gender inequality, social inequity, poverty, and climate change and environmental hazards concomitantly.

3 The discussion brief is based on secondary sources, mainly grey literature (i.e., materials published by well-known organizations, such as organizations within the United Nations system and outside peer-reviewed academic journals). The analysis is limited by significant constraints, such as the lack of recent data on the state of the environment and environmental health impacts in BiH, and the fragmentation of relevant information across multiple sources. For example, except for the 2014 floods, we have found very little disaggregated information about those affected by the impacts of climate change. Therefore, the brief does not pretend to be exhaustive. Rather, it aims to highlight some of the main ways in which air pollution and gender equality, social equity and poverty are linked in the BiH context. Available information does not allow for a differentiated analysis at entity/district level.

4 BiH consists of two entities: the Federation of Bosnia and Herzegovina (FBiH), which itself is composed by 10 cantons, and the Republic of Srpska (RS). The BiH Constitution also established the Brčko District, which falls under the responsibility of the institutions of Bosnia and Herzegovina and whose territory is jointly owned by the two entities.

5 Vulnerability is “the threat of deprivation in multiple dimensions that reduces core human capabilities below the threshold. Vulnerability is a human condition or process resulting from physical, social, economic and environmental factors that determine the likelihood and scale of damage from the impact of a given hazard.” (UNDP, 2016c, p. 138).

Identity and generalisation

It is important to recognize that men, women, persons with disabilities, the poor, the elderly, children, or Roma people do not have one-dimensional identities. They have multiple identities that intersect with each other. For example, a woman may be elderly or young, poor or affluent, and Roma or non-Roma. Therefore, to avoid generalizations, one needs to account for these multiple, intersecting identities. Unfortunately, available information on the interactions between gender equality, social equity, poverty and environmental challenges in BiH does not allow for such a detailed assessment. Hence, the analysis compiled below uses some generalizations, which further studies could help nuance.

Climate change and natural hazards in BiH

Bosnia and Herzegovina faces a variety of geophysical (earthquakes) and hydrometeorological (floods, droughts, heatwaves, wildfires) hazards. While geophysical hazards are unpredictable and have sudden onsets, hydrometeorological hazards are becoming more frequent, unpredictable and severe due to climate change (UNDP, 2016d). In BiH, destructive earthquakes have occurred in Banja Luka (1969), Treskavica (1962) and Ljubinja (1927). The 1969 earthquake in Banja Luka, for instance, resulted in 14 fatalities and caused over \$300 million in damage; however, if an earthquake of that scale were to happen today, it would cause an estimated death toll of over 400 and more than 4 billion USD in damage, based on present-day exposures (World Bank and GFDRR, 2017, p. 19).

The 1969 earthquake led to the development of better seismic infrastructure in BiH. However, a recent assessment on BiH capacities for emergency preparedness and response shows that while equipment and personnel are relatively strong, information, facilities, and legal and institutional accountabilities have remained relatively weak. There is also no reliable warning message system in place for the public (World Bank and GFDRR, 2021). These shortcomings were made clear during the May 2014 floods, which exposed BiH’s vulnerability to both meteorological and geological hazards.

According to the BiH Climate Change Adaptation and Low Emission Development Strategy (UNDP, 2013), climate change manifests itself in BiH through an increase in mean annual temperatures, on the one



Village women with her sheep herd, Bosnia and Herzegovina. Photo: Jasmin Merdan /Gettyimages

hand, and a simultaneous decrease in precipitation, on the other. Climate scenarios indicate further temperature increases in BiH (from 1°C to 6°C, depending on the climate scenario), increased risk of summer rainfall loss, as well as a significant increase in warm extremes and a decrease in cold extremes (GCF and UNDP, 2019).

These changes make BiH increasingly vulnerable to natural hazards such as floods, droughts, heatwaves, heavy precipitation and forest fires (World Bank, 2021). In the past two decades, BiH has been experiencing extreme climate events, including severe droughts, which have led to a significant loss in agricultural production and caused forest fires (Hodžić, Marković and Custovic, 2013; Popov, Gnjato and Trbić, 2019). Heatwaves and disastrous floods have also become more common. For instance, in 2010, the second largest flood on record caused damages amounting to 95 million USD (World Bank and GFDRR, 2017).

BiH is particularly vulnerable to the impacts of climate change compared with other European countries, due to its geographical position, limited adaptive capacity and economic reliance on the agricultural and forestry sectors (which contribute 5.6% to the GDP of BiH, employ nearly 20% of its workforce⁶ and are crucial for

⁶ In BiH, about 20% of women and 16% of men are formally employed in agriculture (Agency for Statistics of Bosnia and Herzegovina, 2019a). In addition, there is a high rate of informal work in the agricultural sector, where “much of the day-to-day farm work is therefore performed by women, with contributions from other family members” (FAO and UN Women 2021, p. xiii).

rural development) (World Bank, 2020; Žurovec, Čadro and Sitaula, 2017). Indeed, financial and institutional constraints have limited BiH’s capacity for adaptation and its ability to respond effectively to natural hazards. As a result, BiH is also more vulnerable to the impacts of climate change than other Eastern European countries (World Bank, 2021).

For instance, the 2014 floods led to the death of more than 20 people and the displacement of 90000 and caused damages amounting to about 2 billion EUR (equivalent to 15% of BiH’s GDP) (USAID, 2016). Regarding the impacts on disadvantaged groups, it is estimated that the floods affected 78564 unemployed persons, 60000 children, as well as 10% of persons with disabilities in BiH (Agency for Statistics of Bosnia and Herzegovina, 2019b). The heavy precipitations that caused the floods also led to more than 3000 landslides, in which as many as 2000 housing units were damaged or destroyed, and the disruption of traffic in over 150 locations on the main road network (UNDP, 2016b). In addition, 51 landslides occurred in areas causing landmines (a legacy of the Bosnian War in the early to mid-1990s) to be displaced and pose an increased risk to populations as a result (UNDP, 2016b).

Climate change can also affect the social and environmental determinants of health, such as air quality, access to safe drinking water, sufficient food and secure shelter (WHO, 2018). In Europe, the serious health impacts caused by extreme climate

change include strokes, mental health problems, diseases with cardiovascular and neurological risks, allergic reactions, diseases caused by waterborne and foodborne bacteria, and diseases transmitted by mosquitos, ticks, and rodents (Wolf et al., 2015). While wider spread and intrusion of new vector-borne diseases is very likely a result of climate change (Vuković and Vujadinović Mandić, 2020), there is currently no system in BiH to monitor the spatial incidence of diseases that may be associated with climate change and/or natural hazards.

From a climate mitigation perspective, BiH has a lower per capita greenhouse gas (GHG) emissions rate than the European Union (EU) average. The most recent inventory shows that per capita (GHG) emissions amounted to approximately 7.38 tons of CO₂eq, which is about 15% less than the average of other EU countries (EU-28) in the same year. At the same time, the GHG intensity of the economy (i.e., the amount of GHG emissions in proportion to BiH's economic output) was more than four times that of the EU average, indicating high potential for increasing resource efficiency in BiH, especially for energy (UNDP, forthcoming).

Interactions between GESEP and climate change

Inequality and climate change are linked in multiple ways. On the one hand, households with higher income are responsible for more carbon emissions per capita than those with a low income (UNDP, 2019). Research shows that in Europe women and men contribute differently to

GHG emissions due to differences in their consumption and behaviors, which are influenced by prevailing gender roles and identities. For instance, women are less likely to own and use a car, and their mobility needs are often affected by their roles as primary caregivers (EIGE, 2020). At the same time, underprivileged people contribute much less to GHG emissions than more privileged groups (Kantha et al., 2020; Alber and Hemmati, 2011). In the case of BiH, there is currently no gender or income disaggregated information about GHG emissions.

On the other hand, unmitigated climate change will worsen existing poverty and exacerbate inequalities, threaten food and water supplies, affect peoples' health and cause the displacement of many people around the world, with poor and disadvantaged people being disproportionately impacted (Hallegatte et al., 2018; IPCC, 2014; Roy et al., 2018). The main factors at play here are differential exposure and vulnerability (Cardona et al., 2012), whereby exposure can be driven by vulnerability, as vulnerable groups are likely to live in less secure, more disaster-prone locations (Winsemius et al., 2018). Overall, climate change worsens existing inequalities by increasing the exposure of already disadvantaged groups to its impacts. This makes them more likely to suffer from damage caused by climate change – and reduces their ability to cope with and recover from the damage endured (Islam and Winkel, 2015). For example, research has shown that socio-economic conditions in BiH are a key determinant of vulnerability in rural municipalities (Žurovec, Čadro and Sitaula, 2017).



Worker at Kakanj coal mine in Bosnia and Herzegovina. Photo: Jasmin Agović

Social characteristics and peoples' social standing play an essential role here, as they "affect an individual's ability to cope with the impacts of climate change, in terms of both avoiding stressors in the immediate term and taking action to protect themselves and their family against future risks" (European Environment Agency, 2020, pp. 89–90). Discriminatory social norms, laws and practices have also been found to be behind unequal levels of exposure, vulnerability and resilience to the impacts of climate change (Segnestam, 2014; UNDP, 2019). Therefore, certain disadvantaged groups, such as the elderly, the sick, children, pregnant women and socially deprived communities, tend to be especially vulnerable to climate change's negative effects (European Environment Agency, 2020). Here, it is important to note that multiple, intersecting factors of discrimination related to gender, age, disability, displacement or minority status can worsen vulnerability to climate change and natural hazards.

For instance, the poor are likely to be especially vulnerable to the impacts of climate change because they tend to live in hazard prone areas and lack the resources to cope with impacts. The specific needs of the poor are often overlooked, and they are rarely involved in shaping responses to hazards. Moreover, they may be especially isolated when living in rural areas (UNDP, 2016c). In BiH, the rural poor, war returnees and displaced persons were particularly affected by the 2014 floods, because they tended to inhabit the most affordable and most risk-exposed terrain on the floodplain (UNDP, 2021).

The elderly are also likely to be vulnerable to the impacts of climate change because of reduced mobility and/or disability, their dependency on others for care and physiological factors (UNDP, 2016c; Watts et al., 2019). They are indeed "at increased risk of heat-related illnesses, compounded by living alone, co-morbidities, medication, and are at higher risk of dehydration than young people, due to the physiological changes that occur as part of the ageing process" (Harper, 2019, pp. 402–403). In BiH and other Western Balkans countries, limitations in the capacity of health and social protection systems can represent an additional risk factor for them (UNDP, 2016c).

Children are less equipped physically, mentally and emotionally to cope with life threatening conditions, which makes them very vulnerable to the negative impacts of climate change, especially the health related ones (Watts et al., 2019). In addition to affecting health prospects, climate change can have implications for children's nutrition, education, and emotional and social wellbeing (UNICEF and Innocenti Research Centre, 2008). This is why UNICEF identifies climate change and air pollution as potential obstacles to the realization of children's rights in BiH (UNICEF, 2020). Children's dependence on others and physical weakness also contribute to their vulnerability to climate change and natural hazards (UNDP, 2016c).

Due to pre-existing health conditions (mobility, hearing, visual impairment), poverty, and reliance on others and on public services that might be discontinued in

times of recovery from a natural disaster, persons with disabilities also tend to be disproportionately affected by climate change and natural hazards (UNDP, 2016c). They often suffer higher rates of morbidity and mortality and have the lowest levels of access to emergency support in society (OHCHR, 2020). During the 2014 floods in BiH, the lack of early warning systems and evacuation protocols accounting for their needs meant that persons with disabilities in the Doboje and Bijeljina areas were hit hard. Many disabled persons saw their lodging destroyed by the floods because they tended to live on the lower floors of buildings. They also could not be systematically reached by the civil defense agencies and had difficulty accessing aid points (UNDP, 2016c).

Gender can also affect levels of vulnerability to the impacts of climate change and natural hazards. The key aspects at play here include gender-based differences in time use, access to assets, limited access to policymaking spaces, and a lack of sex-disaggregated data to inform policymaking (World Bank, 2021). For example, in BiH, the recent devastating floods demonstrated that the greatest impact of hazards on livelihoods tends to be felt in the informal economy where women make up a large part of the workforce (UN Women, forthcoming). Besides, women tend to be less able to respond in case of emergency because of the role of caregivers they often assume in accordance with traditional gender roles. In the Western Balkans, such norms contribute to an increase in women's uptake of unpaid care work when recovering from disasters and in situations of – even temporary – displacement, which further limits their opportunities for emancipation and employment (UN Women, forthcoming).

In general, socially marginalized as well as politically and economically deprived communities are more likely to be exposed to higher temperatures since they cannot afford the necessary adaptations to cool their homes during summer, such as air conditioning units and fans (European Environment Agency, 2020). They may also be more at risk from other natural hazards. For instance, Roma communities tend to live and/or work in environmentally degraded and polluted sites or in areas prone to environmental hazards like floods (Heidegger and Wiese, 2020). As a study of the 2014 floods' impacts and subsequent recovery needs shows, Roma households also tend to be particularly exposed because of their relatively low income, limited employment opportunities, and the poor quality of construction materials used for their houses (European Union et al., 2014). The study also indicated that of the 373 Roma families affected by the floods that were interviewed, "40% had to leave their homes and seek temporary accommodation elsewhere" and 45% had their houses "completely destroyed (no longer habitable) by the flooding/landslides" (European Union et al., 2014, p. 18). During the 2014 floods, members of disadvantaged groups, such as Roma women, were denied support by the local organizations in BiH (Mujić, Frašto and Džekman, 2019).

Similarly, people on the move – such as migrants, returnees and internally displaced persons (IDPs) – are especially vulnerable to the impacts of climate

change and natural hazards due to their unpredictable movement patterns and mobility restrictions, settlement in insecure areas, and lack of access to information (about existing risks and emergency procedures and resources) in their new settlements. Immigrants and refugees are at increased risk from environmental hazards due to language barriers and ephemeral shelters used in hazard prone areas, such as riverbanks (UNDP, 2016c). In BiH, housing built for IDPs and refugees, especially Roma, are often of poor quality, unregistered, and located in low-lying land areas, many of which were flooded in 2014 (European Union et al., 2014). Additionally, people on the move are unfamiliar with land characteristics and local customs which also contributes to their vulnerability (UNDP, 2016c).

Policy considerations

A report on the 2014 floods in the Balkans highlighted the absence of strategic and programmatic institutional policies (in the area of disaster risk reduction) that account for the different needs and capabilities of populations in the region. The report also explored the consequences of such failures for vulnerable groups (UNDP, 2016c). Since the report's publication, there have been efforts to integrate gender into disaster risk reduction policies, for instance through a checklist for gender mainstreaming in the work of protection and rescue institutions at BiH and FBiH level (Mujčić, Frašto and Džekman, 2019). In RS, the Gender Equality Initiative for Disasters was implemented just after the 2014 floods, to carry out "specific programs and measures designed to alleviate and remedy the effects of natural disasters on women and men" (BiH Gender Equality Agency, 2019). However, assistance to vulnerable groups or groups with special needs tends to be organized through agreements with civil society organizations, such as the Federation of Red Cross and Red Crescent Societies (World Bank and GFDRR, 2021).

Therefore, it is crucial to include a more diverse set of voices in the planning and implementation of climate change adaptation strategies and emergency response systems and measures (World Bank, 2021). In case of a hazard, disadvantaged groups are the first to experience its severe effects, but they are also the ones who can gain the most if the impact of the hazard is reduced (UNDP, 2016c). A more inclusive approach would not only make them a part of designing plans and decisions, but also key players in the implementation of strategies. The empowerment of people enables the most vulnerable to become agents of change within their families and communities and enhances their resilience (UNDP, 2016c).

In addition, it is essential to develop early warning systems and adaptation plans that include the perspectives of the elderly, people with disabilities and those who do not speak the local language. In Spain, for instance, the Law on the National System for Civil Protection guarantees an inclusive focus on persons with disabilities, notably in terms of universal access to emergency support and information (OHCHR, 2020). Similarly, awareness-raising and capacity building programmes targeting and tailored to disadvantaged groups can help increase their preparedness and adaptive capacity. For example,

increasing the knowledge and skills of women farmers on innovative measures for climate change adaptation helps reduce their vulnerability to the impacts of climate change (Raj et al., 2020). RS's Strategy for Improving the Situation of Women in Rural Areas (2017-2022) promotes the provision of incentives for developing new forms of production, self-employment, entrepreneurship and cooperatives for rural women.

From an institutional perspective, in addition to promoting more diversity among public officials, it is important to deepen their knowledge of the needs of disadvantaged groups. This could be done through, for example, training and increased collaboration with NGOs and public institutions working on gender inequality, social inequity and poverty. It is also essential to clarify the roles and responsibilities of the different agencies, ministries and other public institutions with regards to policies, strategies and programmes addressing disaster risk reduction and climate change (UNICEF, 2020), while ensuring effective institutional collaboration and coordination (World Bank and GFDRR, 2021). However, while a better integration of the requirements of disadvantaged groups in responses to climate change and natural hazards is necessary, it is crucial to address the structural inequity that is behind differentiated vulnerability and exposure levels in the first place (Islam and Winkel, 2015; UNDP, 2019).

Climate mitigation and adaptation policies may also have implications for gender equality, social equity and poverty in themselves. These implications can be beneficial or detrimental. From an adaptation perspective, some measures can result in what has been called "maladaptation", whereby adaptation measures "may lead to increased risk of adverse climate related outcomes, including via increased GHG emissions, increased vulnerability to climate change, or diminished welfare, now or in the future" (EEA, 2019, p. 13). For example, building flood defenses alone may lead to worse disasters by facilitating further development behind the structures (e.g., new infrastructure and buildings) and neglecting to provide complementary solutions, such as advanced hydrometeorological forecasting and early warning systems, in the event of defenses failing (Noble et al., 2014). Another example is how the winter tourism industry in the Western Balkans (and elsewhere in Europe) has used snow-making systems to address low snow cover and associated economic losses (Alfthan et al., 2015). This strategy is not sustainable in the long-term and only delays the implementation of necessary transformative solutions (Trébaol, 2020).

From an adaptation perspective, measures designed to increase adaptive capacity, such as improving climate change awareness among the general population and public officials, are less likely to be maladaptive than measures that aim to reduce exposure (Barnett and O'Neill, 2013). Moreover, it is important to keep in mind that measures effective in the short-term may have negative implications in the long-term. For example, promoting high-yielding crop varieties may boost production and increase revenues in the short-term, but it also makes farmers more vulnerable in the long-term as monocrops become more exposed and vulnerable



Landslide damage. Photo: International Disaster Volunteers / Flickr

to climate change (World Bank, 2010). Similarly, the construction of adaptation built (or “hard”) infrastructure may protect populations from floods in the short-term, but they limit the range of future adaptation options (Noble et al., 2014).

On the mitigation side, policies in the fields of energy efficiency and transport may reduce health inequalities through improved air quality and living conditions (European Commission, 2016; Vandyck et al., 2020). Climate mitigation measures can also help meet Sustainable Development Goals, such as access to affordable and clean energy, improved soil and water quality, biodiversity conservation and improved economic performance (Global Commission on the Economy and Climate, 2014; Karlsson, Alfredsson and Westling, 2020). In addition, they may generate new opportunities for income generation in certain sectors, including renewable energy, public transport, energy efficiency, sustainable agriculture and circular economy (European Commission, 2016; Hamilton, 2017; ILO, 2018; IRENA, 2018). In BiH, the implementation of the National Energy Efficiency Action Plan could create up to 3652 jobs per year over a nine-year period, primarily in the construction sector (UNDP, 2016a).

However, climate mitigation policies may lead to the loss of jobs in carbon-intensive sectors (World Bank, 2018). Experiences in European countries have also shown they can result in an increase in the price of essential goods and services, such as energy or transport (Dorband et al., 2019; Frondel, Sommer and Vance, 2015; Sovacool et al., 2019). Overall, research shows that “the risk of negative outcomes is greater in contexts characterized by high levels of poverty, corruption and economic and social inequalities, and where limited action is taken to identify and mitigate potentially adverse side-effects” (Markkanen and Anger-Kraavi, 2019, p. 827).

Hence, it is important to assess these implications and implement strategies to mitigate the detrimental effects of

climate policy on disadvantaged groups. From a mitigation perspective, this involves measures such as subsidies and exemptions, social safety nets, and various types of revenue recycling (Atteridge and Strambo, 2020; Beiser-McGrath and Bernauer, 2019; Marcu and Vangenechten, 2018). Several initiatives have been put in place to address the undesired impacts of decarbonization and ensure that the process and its outcomes are fair, such as the initiative for coal regions in transition in the Western Balkans and Ukraine, managed by the EU and other international partners (European Commission, 2021) or the European Bank for Reconstruction and Development’s just transition initiative (EBRD, 2020). These initiatives represent opportunities to explore the question of coal transitions in the BiH context. Improving institutional capacities in BiH would enable its participation in such mechanisms and help it to benefit from them.

References

- Agency for Statistics of Bosnia and Herzegovina (2019a). Labour Force Survey 2019. Sarajevo: BHAS.
- (2019b). Voluntary Review. Implementation of Agenda 2030 and the Sustainable Development Goals in Bosnia and Herzegovina. Sarajevo: United Nations in Bosnia and Herzegovina.
- Alber, G., and Hemmati, M. (2011). Gender Perspectives: Debunking Climate Policy Myths. Vancouver: Commonwealth Ministers.
- Alfthan, B., Krilasević, E., Venturini, S., Bajrović, S., Jurek, M., Schoolmeester, T., Sandei, P.C., Egerer, H., and Kurvits, T. (2015). Outlook on Climate Change Adaptation in the Western Balkan Mountains. Mountain Adaptation Outlook Series. Vienna, Arendal and Sarajevo: United Nations Environment Programme, GRIDArendal and Environmental Innovations Association.
- Atteridge, A., and Strambo, S. (2020). Seven Principles to Realize a Just Transition to a Low-Carbon Economy. SEI Policy Report. Sweden: Stockholm Environment Institute. <https://www.sei.org/publications/seven-principles-to-realize-a-just-transition-to-a-low-carbon-economy/>.

- Barnett, J., and O'Neill, S.J. (2013). Minimising the Risk of Maladaptation: A Framework for Analysis. In *Climate Adaptation Futures*, Palutikof, J.P. et al., 87–94. Hoboken, New Jersey: Wiley-Blackwell.
- Beiser-McGrath, L. F., and Bernauer, T. (2019). Could Revenue Recycling Make Effective Carbon Taxation Politically Feasible? *Science Advances* 5 (9): eaax3323. <https://doi.org/10.1126/sciadv.aax3323>.
- BiH Gender Equality Agency (2019). Progress Report on the Implementation of the Beijing Declaration and Platform for Action in BiH within the Beijing +25 Process. Sarajevo: BiH GEA.
- Cardona, O.D., van Aalst, M.K., Birkmann, J., Fordham, M., McGregor, G., Perez, R., Pulwarty, P. R., Schipper, E.L.F., and Sinh, B.T. (2012). Determinants of Risk: Exposure and Vulnerability. In *A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change*, C.B. Field, V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor and P.M. Midgley, eds. Cambridge: Cambridge University Press.
- Dorband, I. I., Jakob, M., Kalkuhl, M., and Steckel, J. C. (2019). Poverty and Distributional Effects of Carbon Pricing in Low- and Middle-Income Countries – A Global Comparative Analysis. *World Development* 115 (March): 246–57. <https://doi.org/10.1016/j.worlddev.2018.11.015>.
- EBRD (2020). The EBRD Just Transition Initiative. Sharing the Benefits of a Green Economy Transition and Protecting Vulnerable Countries, Regions and People from Falling Behind. London: European Bank for Reconstruction and Development. <https://www.ebrd.com/what-we-do/just-transition-initiative>.
- EEA (2018). Unequal Exposure and Unequal Impacts: Social Vulnerability to Air Pollution, Noise and Extreme Temperatures in Europe. EEA Report No 22/2018. Copenhagen: European Environment Agency.
- (2019). Adaptation Challenges and Opportunities for the European Energy System. Building a Climate-resilient Low-carbon Energy System. Luxembourg: European Union.
- (2020). Healthy Environment, Healthy Lives: How the Environment Influences Health and Well-Being in Europe. Publication. Copenhagen: European Environment Agency. <https://www.eea.europa.eu/publications/healthy-environment-healthy-lives>.
- EIGE (2020). Beijing + 25, the Fifth Review of the Implementation of the Beijing Platform for Action in the EU Member States: Area K, Women and the Environment: Climate Change Is Gendered. LU: European Union. <https://data.europa.eu/doi/10.2839/300775>.
- European Commission (2016). The Macroeconomic and Other Benefits of Energy Efficiency. Brussels: European Union. https://ec.europa.eu/energy/sites/ener/files/documents/final_report_v4_final.pdf [Google Scholar].
- (2021). Initiative for Coal Regions in Transition the Western Balkans and Ukraine. Text. Energy - European Commission. February 15, 2021. https://ec.europa.eu/energy/topics/oil-gas-and-coal/coal-regions-in-the-western-balkans-and-ukraine/initiative-coal-regions-transition-western-balkans-and-ukraine_en.
- European Union, United Nations, GFDRR and World Bank (2014). Bosnia and Herzegovina Floods 2014. Recovery Needs Assessment. Sarajevo: EU (European Union), UN (United Nations), GFDRR, and World Bank Group.
- FAO and UN Women (2021). National Gender Profile of Agriculture and Rural Livelihoods. Bosnia and Herzegovina. Budapest, Sarajevo: FAO, UN Women.
- Frondel, M., Sommer S., and Vance, C. (2015). The Burden of Germany's Energy Transition: An Empirical Analysis of Distributional Effects. *Economic Analysis and Policy* 45 (March): 89–99. <https://doi.org/10.1016/j.eap.2015.01.004>.
- GCF and UNDP (2019). Updated Existing Climate Change Scenarios for Bosnia and Herzegovina and Developed Climate Change Scenarios RCP 2.6, RCP 4.5, RCP 6.0 and RCP8.5 According to the Intergovernmental Panel on Climate Change – Fifth Report. Green Climate Fund and the United Nations Development Programme.
- Global Commission on the Economy and Climate (2014). Better Growth, Better Climate: The New Climate Economy Report: Executive Summary. Washington, DC: World Resources Institute.
- Hallegatte, S., Fay, M., and Barbier, E. (2018). Poverty and Climate Change: Introduction. *Environment and Development Economics* 23 (3): 217–33. <https://doi.org/10.1017/S1355770X18000141>.
- Hamilton, K. (2017). How Can We Ensure the Energy Transition Leaves No Worker Behind? World Economic Forum (blog). November 10, 2017. <https://www.weforum.org/agenda/2017/11/energy-transition-leave-no-worker-behind-skills-jobs/>.
- Harper, S. (2019). “The Convergence of Population Ageing with Climate Change.” *Journal of Population Ageing* 12 (4): 401–3. <https://doi.org/10.1007/s12062-019-09255-5>.
- Heidegger, P., and Wiese, K. (2020). Pushed to the Wastelands. Environmental Racism against Roma Communities in Central and Eastern Europe. Brussels: European Environmental Bureau.
- Hodžić, S., Marković, M., and Custović, H. (2013). Initiative on “Capacity Development to Support National Drought Management Policy. Bosnia and Herzegovina - Concise Country Report.” WMO, UNCCD, FAO and UNW- DPC. www.droughtmanagement.info.
- International Labour Organisation (ILO) (2018). World Employment Social Outlook: Greening with Jobs. Geneva: International Labour Organisation. <https://www.ilo.org/global/research/global-reports/weso/greening-with-jobs/lang--en/index.htm>.
- Intergovernmental Panel on Climate Change (IPCC) (2014). Climate Change (2014). Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva: Intergovernmental Panel on Climate Change.
- International Renewable Energy Agency (IRENA) (2018). Renewable Energy and Jobs – Annual Review 2018. Abu Dhabi: IRENA. <https://www.irena.org/publications/2018/May/Renewable-Energy-and-Jobs-Annual-Review-2018>.
- Islam, S. N., and Winkel, J. (2015). Inequality and Environmental Sustainability. DESA Working Paper 145. United Nations Department of Economic & Social Affairs.
- Karlsson, M., Alfredsson, E., and Westling, N. (2020). Climate Policy Co-Benefits: A Review. *Climate Policy* 20 (3): 292–316. <https://doi.org/10.1080/14693062.2020.1724070>.
- Kartha, S., Kemp-Benedict, E., Ghosh, E., Nazareth, A., and Gore, T. (2020). The Carbon Inequality Era. An Assessment of the Global Distribution of Consumption Emissions among Individuals from 1990 to 2015 and Beyond. Joint Research Report. Stockholm Environment Institute and Oxfam International. <https://www.sei.org/publications/the-carbon-inequality-era/>.
- Mackie, A., and Haščić, I. (2018). The Distributional Aspects of Environmental Quality and Environmental Policies: Opportunities for Individuals and Households. Issue paper. Paris: OECD.

- Marcu, A., and Vangenechten, D. (2018). *Managing a Sustainable Transition to a Low-Carbon Society: The Socio-Economic Impacts of Mitigation Policies*. Geneva: International Centre for Trade and Sustainable Development (ICTSD).
- Markkanen, S., and Anger-Kraavi, A. (2019). Social Impacts of Climate Change Mitigation Policies and Their Implications for Inequality. *Climate Policy* 19 (7): 827–44. <https://doi.org/10.1080/14693062.2019.1596873>.
- Mujić, M., Frašto, V. and Džekman, V. (2019). *Analysis and Checklist for Gender Mainstreaming in the Work of Protection and Rescue Institutions in BiH. Gender Mainstreaming in Protection and Rescue and Disaster Risk Reduction*. Sarajevo: The Cure Foundation.
- Noble, I. R., Huq, S., Anokhin, Y. A., Carmin, J. A., Goudou, D., Lansigan, F. P., Osman-Elasha, B., Villamizar, A., Patt, A., Takeuchi, K., and Chu, E. (2014). *Adaptation Needs and Options*. In *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel of Climate Change*, edited by C. B. Field, V. R. Barros, D. J. Dokken, K. J. Mach, M. D. Mastrandrea, T. E. Bilir, M. Chatterjee, et al., 833–68. Cambridge, UK, and New York: Cambridge University Press.
- Popov, A., Gnjato, S., and Trbić, G. (2019). Effects of Changes in Extreme Climate Events on Key Sectors in Bosnia and Herzegovina and Adaptation Options. In *Climate Change Adaptation in Eastern Europe: Managing Risks and Building Resilience to Climate Change*, Leal Filho, W., Trbić, G., Filipović, D. Springer Nature.
- Raj, R., Devaraj, M., Selvamukilan, B., Ramalingam, S., and Cas, B. (2020). Improving Women's Access to Climate Information Services and Enhancing Their Capability to Manage Climate Risks. *APN Science Bulletin*, February. <https://doi.org/10.30852/sb.2020.946>.
- Roy, J., Tscharket, P., Waisman, H., Abdul Halim, S., Antwi-Agyei, P., Dasgupta, P., Hayward, B., Kanninen, M., Liverman, D., Okereke, C., Pinho, P. F., Riahi, K. and Suarez Rodriguez, A. G. (2018). Sustainable Development, Poverty Eradication and Reducing Inequalities. In *Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*, Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield. Geneva: IPCC: Intergovernmental Panel on Climate Change.
- Segnestam, L. (2014). *Culture and Capacity: Drought and Gender Differentiated Vulnerability of Rural Poor in Nicaragua, 1970-2010*. Stockholm: Acta Universitatis Stockholmiensis.
- SEI (2019). *Strategy 2020–24. Knowledge for Action*. Stockholm: Stockholm Environment Institute. <https://www.sei.org/wp-content/uploads/2019/11/sei-strategy-2020%E2%80%9324-report-web.pdf>.
- Sida (2017). *Dimensions of Poverty Sida's Conceptual Framework*. Stockholm: The Swedish International Development Cooperation Agency. <https://publikationer.sida.se/English/publications/149106/dimensions-of-poverty-sidas-conceptual-framework>.
- Sovacool, B.K., Martiskainen, M., Hook, A., and Baker, L. (2019). Decarbonization and Its Discontents: A Critical Energy Justice Perspective on Four Low-Carbon Transitions. *Climatic Change* 155 (4): 581–619. <https://doi.org/10.1007/s10584-019-02521-7>.
- Strambo, C., Jahović, B., and Segnestam, L. (2021). *Strengthening Environmental Policy in BiH with a Gender Equality, Social Equity, and Poverty Reduction Approach*. Sweden: Stockholm Environment Institute.
- Trébaol, A. (2020). *Is the Ski Industry Self-Destructive? State of the Planet* (blog). July 8, 2020. <https://news.climate.columbia.edu/2020/07/08/ski-industry-self-destructive/>.
- UN Women (forthcoming). *Women's Economic Empowerment and Disaster Risk Reduction in BiH*. Sarajevo: UN Women.
- UNDP (2010). *Evaluation of UN DP Contribution to Environmental Management for Poverty Reduction: The Poverty-Environment Nexus*. New York: UNDP.
- (2013). *Climate Change Adaptation and Low Emission Development Strategy for Bosnia and Herzegovina*. Sarajevo: MoF TER, FMET, MSPCE RS, UNDP, GEF.
- (2016a). *Green Jobs. Analysing the Employment Impact of Energy Efficiency Measures in Bosnia and Herzegovina*. Tuzla: UNDP, Centar za razvoj i podršku (CRP).
- (2016b). *Landslide Management Study in Bosnia and Herzegovina*. UNDP.
- (2016c). *Risk-Proofing the Western Balkans: Empowering People to Prevent Disasters*. Human Development Report. Sarajevo: UNDP in Bosnia and Herzegovina.
- (2016d). *Third National Communication and Second Biennial Update Report on Greenhouse Gas Emissions of BiH*. Sarajevo: UNDP.
- (2019). *Beyond Income, beyond Averages, beyond Today: Inequalities in Human Development in the 21st Century*. Human Development Report. New York: UNDP.
- (2021). *Scaling up Climate Resilient Flood Risk Management in Bosnia and Herzegovina*. <https://www.gcfprojects-undp.org/tp/project/6360>.
- (forthcoming). *Climate Change Adaptation and Low Emission Development Strategy for Bosnia and Herzegovina*. UNDP.
- UNEP (2017). *Gender and Environment: Support Kit for UN Environment Staff*. New York: United Nations Environment Programme. http://wedocs.unep.org/bitstream/handle/20.500.11822/25348/Gender_Environment_Kit.pdf?sequence=1&isAllowed=y.
- UNICEF (2020). *Situation Analysis of Children in Bosnia and Herzegovina*. UNICEF. <https://www.unicef.org/bih/en/reports/situation-analysis-children-bosnia-and-herzegovina>.
- UNICEF and UNICEF Innocenti Research Centre (2008). *“Climate Change and Children. A Human Security Challenge.”* The United Nations Children's Fund.
- United Nations High Commissioner for Human Rights (OHCHR) (2020). *Analytical Study on the Promotion and Protection of the Rights of Persons with Disabilities in the Context of Climate Change*. Report of the Office of the United Nations High Commissioner for Human Rights. New York: United Nations. <https://undocs.org/A/HRC/44/30>.
- USAID (2016). *Climate Change Risk Profile. Bosnia and Herzegovina. Fact Sheet*. USAID. <https://www.climatelinks.org/sites/default/files/asset/document/2016%20CRM%20Fact%20Sheet%20-%20Bosnia%20%28003%29.pdf>.
- Vandyck, T., Keramidis, K., Tchung-Ming, S., Weitzel, M., and Van Dingenen, R. (2020). *Quantifying Air Quality Co-Benefits of Climate Policy across Sectors and Regions*. *Climatic Change*, April. <https://doi.org/10.1007/s10584-020-02685-7>.

Vuković, A., and Vujadinović Mandić, M. (2020). Study on Climate Change in the Western Balkans Region. SEE2020 Series. Sarajevo: Regional Cooperation Council.

Watts, N., Amann, M., Arnell, N., Ayeb-Karlsson, S., Belesova, K., Boykoff, M., Byass, P. et al. (2019). The 2019 Report of The Lancet Countdown on Health and Climate Change: Ensuring That the Health of a Child Born Today Is Not Defined by a Changing Climate. The Lancet 394 (10211): 1836–78. [https://doi.org/10.1016/S0140-6736\(19\)32596-6](https://doi.org/10.1016/S0140-6736(19)32596-6).

WHO (2018). Climate Change and Health. Fact Sheet. Geneva: WHO. <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>.

——— (2019). Environmental Health Inequalities in Europe. Geneva: WHO.

WHO Regional Office for Europe (2013). Physical Activity Promotion in Socially Disadvantaged Groups: Principles for Action Policy Summary. Copenhagen: WHO Regional Office for Europe.

Winsemius, H.C., Jongman, B., Veldkamp T.I.E., Hallegatte, S., Bangalore, M., and Ward, P.J. (2018). Disaster Risk, Climate Change, and Poverty: Assessing the Global Exposure of Poor People to Floods and Droughts. Environment and Development Economics 23 (3): 328–48. <https://doi.org/10.1017/S1355770X17000444>.

Wolf, T., Lyne, K., Sanchez Martinez, G., and Kendrovski, V. (2015). The Health Effects of Climate Change in the WHO European Region. Climate 3(4): 901-936. <https://doi-org.ezp.sub.su.se/10.3390/cli3040901>.

World Bank (2010). World Development Report 2010: Development in a Changing Climate – Concept Note. The International Bank for Reconstruction and Development / The World Bank, Washington, DC, USA, 43 pp.

——— (2018). Managing Coal Mine Closure. Achieving a Just Transition for All. Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/484541544643269894/pdf/130659-REVISED-PUBLIC-Managing-Coal-Mine-Closure-Achieving-a-Just-Transition-for-All-November-2018-final.pdf>.

——— (2020). World Development Indicators. World Bank. <https://databank.worldbank.org/source/world-development-indicators>.

World Bank (2021). Climate Risk Profile: Bosnia and Herzegovina. The World Bank Group. <https://climateknowledgeportal.worldbank.org/country/bosnia-and-herzegovina>.

World Bank and GFDRR (2021). Diagnostic Report. Emergency Preparedness and Response Assessment. Ready 2 Respond. Washington, D.C.: World Bank and Global Facility for Disaster Reduction and Recovery. <https://reliefweb.int/report/bosnia-and-herzegovina/bosnia-and-herzegovina-ready-2-respond-emergency-preparedness-and-response-assessment-diagnostic-report.pdf>

Žurovec, O., Čadro, S., and Kumar Sitaula, B. (2017). Quantitative Assessment of Vulnerability to Climate Change in Rural Municipalities of Bosnia and Herzegovina. Sustainability 9 (7): 1208. <https://doi.org/10.3390/su9071208>.

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