
# Evidence and processes for mainstreaming peacebuilding in climate adaptation efforts

## A framework and a safeguard approach for conflict-sensitive and peace-responsive climate action: the Climate Security Sensitiveness Tool (CSST)

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# 1. Introduction

There is widespread agreement that efforts to support productive systems threatened by ongoing climate-related impacts are beneficial to secure food production and livelihoods viability. Climate adaptation programs disseminating climate-smart agricultural technologies, practices and information are proving to positively impact resilience and food and nutrition security in beneficiary countries (Mizik, 2021; Thornton et al., 2022; World Bank, 2021). However, little is known about the potential positive and negative externalities that such programs can lead to (Smith et al., 2021), especially in relation to peace and security. Maladaptation is the process whereby improperly built adaptation strategies can result in more vulnerability (Schipper, 2020). It is also referred to as climate actions that have a negative impact on the vulnerability of other systems, sectors, or social groups (Barnett & O'Neill, 2010). It can create and sustain lock-ins, magnify inequity, marginalize people, and places vulnerable to climate-related risks, such as low-income households, people who reside in informal settlements, ethnic minorities, Indigenous Peoples among others (IPCC, 2022). These are commonly recognized drivers of conflict which must be accounted for while designing programs to avoid creating or exacerbating conflicts. Acknowledging the interlinkages between climate action, natural resource use and peace and security is fundamental to integrate climate and conflict sensitive programming interventions. Maladaptive climate initiatives, neglecting those associations, have proved to foster power asymmetries, grievances, and competition for resources, especially in conflict-affected contexts (Moran et al., 2018; Krampe et al., 2021a). The case of a protected forest area project implemented in 2012 in the Prey Lang landscape in Cambodia illustrates how maladaptation can lead to conflict. This program aimed to mitigate climate impacts, conserve biodiversity, and increase equitable economic benefits to forest communities; but it however failed to include local forest users and recognize their forest management needs which led to their mobilization against the national Forest Administration resulting in a conflict over injustices (Work et al., 2019). Social and environmental safeguards for conflict-sensitive and peace-responsive climate action are critical to make sure that these interventions at least 'do no harm', and possibly undertake 'do good' approaches.

Despite a growing recognition of the importance of linking these fields of practice, peace interventions and climate adaptation are rarely jointly integrated in adaptation efforts (Mosello and Rüttinger, 2020). Such disassociation can be observed in the absence of funds and measures currently allocated to peacebuilding efforts in climate adaptation interventions, highlighting the importance of aligning climate adaptation and peace objectives and incentives (Mosello and Rüttinger, 2020; Läderach et al., 2021). The Climate-Peace Framework (CPF) we propose attempts to bridge this gap through the integration of conflict-sensitivity in climate action programs. Conflict-sensitivity is an approach to interventions that seeks to avoid causing harm while also contributing to peace (Tänzler and Scherer, 2019). Applying this safeguard approach to climate action interventions has the potential to help prevent future conflicts or relapses in implementation sites, as well as develop and preserve peace (Läderach et al., 2021). Climate action here should be understood in terms of climate smart technologies, practices and services that aim to strengthen the climate resilience of farmers in the Global South (Loboguerrero and Hellin, 2021).

This framework was conceptualized to lay the theoretical foundations for an actionable tool meant to be used as a safeguard approach for climate action programs: the Climate Security Sensitiveness Scoring Tool (CSST). This tool targets practitioners, decision makers and multilateral institutes interested in diagnostic research for peace responsive climate action in the context of agriculture and rural development. Its goal is to link climate adaptation and peacebuilding through ex ante evaluating whether climate action programs and their implementation modalities are appropriate for the context in which they are carried

out, and to recommend strategies to strengthen their suitability. The CSST intends to appraise the suitability of climate-smart agricultural operations in relation to context-specific drivers of conflict, as well as to optimize their relevance for peacebuilding by tailoring their implementation to pre-existing socio-political and conflictual conditions. It is used at the designing phase of a project, and it provides graphic representations of the extent to which climate adaptation-related mechanisms respond to those drivers.

This paper aims to provide a theoretical and conceptual framework to distil the complex problem around linking climate adaptation, conflict sensitivity and peacebuilding, with the final goal of operationalizing it into a practical tool. While aware that conflict sensitivity and peacebuilding are two distinct concepts, the framework we propose lays the baseline for a tool addressing both ends. Conflict sensitivity minimizes negative and maximizes positive impacts of programming on conflict, while peacebuilding seeks to reduce key drivers of violent conflict and to contribute to broader societal-level peace (van Brabant, 2010). By linking such fields of practice in agricultural development programs, we strive to provide a scheme for climate action practitioners to better identify and address contextual drivers of conflict while advancing peacebuilding processes. To address such goals, this paper will answer the following research questions:

- What evidence is needed to inform investments, programming and policy to avoid doing harm and achieve the double dividend of climate adaptation and peace?
- What indicators and mechanisms are useful to conceptualize a practical and context-specific tool recommending on conflict-sensitive and peace-responsive climate action programming?

This paper firstly provides an overview of how existing theoretical discourses guided the development of the present theoretical and conceptual Climate-Peace Framework (CPF). Secondly, it outlines the CPF itself while justifying linkages between climate adaptation and peacebuilding. It then moves on to lay the theoretical groundwork for how this model can respond to common insecurity factors, with the goal of developing a tool for prioritizing mechanisms to address contextual conflict and insecurity drivers when designing climate interventions. Lastly, it describes the CSST methodology.

## 2. Environmental Peacebuilding Knowledgebase

The programming toolkit we propose is based on a conceptual CPF rooted in the environmental peacebuilding literature and adapted to typify climate-peace mechanisms specifically. Environmental peacebuilding is the best-positioned academic field to frame linkages between climate action and peace due to its adequacy and effectiveness in connecting environmental and natural phenomena to more social, economic and political ones. This section reports on the literature employed to qualify different environmental peacebuilding mechanisms and existing trajectories through which natural resource management (NRM) can reduce the risk for conflict and contribute to peace.

Existing environmental peacebuilding frameworks that serve as the conceptual foundation for our CPF include the ones developed by Dresse et al. (2019) and by Johnson et al. (2021). The rationale behind environmental peacebuilding discourses is that shared environmental challenges and resource-based disputes can be translated into opportunities for cooperation, integration and peace by transforming NRM strategies (Rüttinger et al., 2014). Depending on the latent intercommunal relations, social norms and potential drivers of conflict, some NRM practices may be more relevant for building peace and resilience, while some other practices may lead to more inequalities and grievances. These frameworks introduce

the notion that conflicting parties can address shared environmental challenges through differing peacebuilding mechanisms at different levels of intercommunal cohesion.

Dresse and colleagues define technical, restorative, and sustainable environmental peacebuilding mechanisms, each being suitable for given intercommunal conditions (Dresse et al., 2019). Technical mechanisms are efficient strategies for peacebuilding when conflict parties' tensions are severe; they allow "technical cooperation through coordinated action" and resolve technocratically the environmental causes of conflicts while minimizing trans-boundary contacts and dialogue (Dresse et al., 2019; Carius, 2006a). Ecopeace's Good Water Neighbours project is a technical mechanism example for shared environmental challenges in Middle Eastern communities (Obidallah, 2015). The establishment of a sewage collection system in a Palestinian town connected to the network of an Israeli community has resulted in the prevention of pollution of a shared water stream. This project can be considered as a technical mechanism since it was neutrally coordinated by a third party and fostered intergroup contact and interactions between conflict parties while reducing water scarcity and resource degradation (Harari and Roseman, 2008). Since Palestinian and Israeli intercommunal dynamics are known to be hostile and in need for neutral support that enables little interaction between parties while still fostering shared identities, this technical mechanism can be deemed as appropriate for the context in which it was applied.

Restorative mechanisms are appropriate strategies when conflict parties can exchange on shared values and break down mutual stereotypes: conditions enable direct contact between parties. These mechanisms create "neutral spaces of interaction through dialogue and negotiation" in that they tackle environmental interdependence created by shared biophysical spaces while promoting dialogue (Dresse et al., 2019; Barnett et al., 2007; Harwell, 2016). An example of a restorative mechanism is the Inter Collectivité du Sourou Mali project, which united 29 territorial entities to develop an Integrated Sustainable Development Programme for wetlands shared by Mali and Burkina Faso (ICS, 2019). This project can be considered as a restorative mechanism since it created neutral spaces of interaction and negotiation between resource inter-dependent communities while covering the interests of the region (Molenaar and Nooteboom, 2020). Since those communities experienced intergroup contact in shared biophysical spaces, while power symmetry between them lacked due to Burkinabe natural resource governance structures in the Sourou region outcompeting Malian ones, this restorative mechanism was appropriate for the intercommunal dynamics present in this landscape requiring a bare minimum level of intercommunal contact to enable dialogue.

Sustainable mechanisms are suited strategies when there are no disparities in wealth, power and negotiating capacity between conflict parties; these strategies manage "common-pool resource through collective action" in that they reduce unequal distribution of resources while promoting joint socioecological management systems (Dresse et al., 2019; Vallet, 2020; Carius, 2006b; Zikos et al., 2015). These resource apolitical mechanisms, characterized by actions fostering joint management systems and equitable resource distribution, emerge from both high-level and grassroots figures and they can only be developed upon symmetrical power relations (Zikos et al., 2015; Dresse et al., 2019; Carius, 2006). An example of a sustainable mechanism is the bi-communal water management of a mixed Greek-Turkish village in Cyprus located in the island's buffer zone and designed by the village itself to self-supply potable water. This plan can be considered as a sustainable mechanism since it consisted in the collective and willful participation of antagonistic communities in securing access to a common resource. However, high-level leadership figures did not support the plan due to intercommunal identity issues, and it failed (Zikos

et al., 2015). Since Northern and Southern Cyprus intercommunal dynamics are hostile whilst sharing biophysical environments, the bi-communal water management plan was not appropriate for the intercommunal dynamics present in the landscape. Power symmetry lacked between the two sides and the bicommunal resource management plan became politicized (Zikos et al., 2015). Restorative or technical mechanisms would have perhaps worked better in this intercommunal landscape requiring developments in intergroup contact and trust.

The framework introduced by Johnson and colleagues defines four dimensions of peace framing the peacebuilding process from negative to positive peace outcomes: absence of conflict, shared identity, capabilities and substantial integration (Johnson et al., 2021). Additionally, it introduces specific mechanisms capable to link NRM initiatives to those peace dimensions. These include 1) economic development strategies through which NRM supports livelihoods of conflict-affected populations; 2) building institutional capacity for both NRM and peacebuilding, which can lead to enhanced state legitimacy and representation of marginalized social groups; 3) building trust, cooperation and interdependence among potentially conflicting groups, leading in turn to shared identity and future-state visions; 4) developing and implementing strategies to improve environmental conditions, social resilience and the sustainable access and use of resources; and 5) enhancing knowledge through education, environmental and social awareness, and the integration of plural knowledges.

Economic development in NRM is particularly relevant in conflict-affected and post-conflict contexts as resource revenues are crucial to people's livelihoods (Johnson et al., 2021; Young and Goldman, 2015). Building institutions for NRM is important regardless of the peace dimension targeted as it is a mechanism that secures property rights, enhances the rule of law, regulates and delivers public services (Acemoglu and Robinson, 2012; Bruch et al., 2016). Building trust and cooperation is a mechanism specifically important resolving violent conflicts and for building shared identity: collective NRM can increase interaction rates, reduce tensions and establish mutual legitimacy and rights (UNEP, 2009; Conca, 2002). Resource sustainability can help prevent conflict while contributing to capabilities: reducing environmental degradation and restoring ecosystems is a means of protecting resources on which livelihoods depend and fostering human security (Johnson et al., 2021; Hellin et al., 2018). Finally, enhancing knowledge is a mechanism with the potential to create shared identities, promote social inclusion and equity as well as foster capabilities and awareness reducing the likelihood of conflict (Johnson et al., 2021).


***Figure 1: Environmental peacebuilding mechanisms for different peacebuilding trajectories. Adapted from Dresse, A., Fischhendler, I., Nielsen, J. Ø., & Zikos, D. (2019) and Johnson, M. F., Rodríguez, L. A., & Hoyos, M. Q. (2021)***

Figure 1 illustrates how we conceptualize and categorize environmental peacebuilding mechanisms through these theoretical frameworks, and how we frame trajectories for desired peace-contributing potential based on contextual needs and cohesion levels. The characteristics of these peacebuilding mechanisms are the building blocks of the indicators' selection for our climate security sensitiveness scoring tool, while the negative to positive peace continuum they form can inform on ideal climate action practices to optimize the peace-contributing potential in contexts of implementation.

# 3. Climate-Peace Framework (CPF)

The framework we conceptualize is structured upon the literature described in the previous section and is adapted specifically to frame climate action for peacebuilding. This framework was complemented with theories indicating how climate action can contribute to peace and sustainable livelihoods. Those theories include resilience, NRM, inequality, conflict resolution and collective action discourses (Folke et al., 2010; Folke, 2016; Jeans et al., 2019; Carius, 2006b; Krampe et al., 2021b; Ratner et al., 2017). The same way that environmental peacebuilding is defined as "the process through which environmental challenges shared by conflicting parties are turned into opportunities to build lasting cooperation and peace" (Dresse et al., 2019), we define climate-peace mechanisms as the potential of climate action to unify conflicting communities against shared climate-related insecurities. This framework lays the theoretical groundwork for linking climate intervention characteristics to peace-contributing outcomes in order to pursue climate-resilient peace. Climate-resilient peace is defined as is the process of addressing imbalances in access and distribution of power and resources in response to the structures that drive climate change and influence experience of its impacts (Nicoson, 2021).


***Figure 2: Diagram illustrating the climate-peace framework adapted from environmental peacebuilding***

This framework (figure 2) is composed of initial conditions characterizing intergroup cohesion levels, peace dimensions referring to desirable peacebuilding outcomes for each initial condition, and climate-peace pathways leading to these outcomes through different mechanisms and contributing to different degrees of peace potential. In our adapted framework, we dropped the technical, restorative, and sustainable terms introduced by Dresse and renamed those pathways respectively 'technocratic climate action', 'climate action for conflict resolution' and 'climate action for conflict transformation', while maintaining their peacebuilding connotations, related initial condition stages and outcomes.

## *Initial Conditions*

The CPF further details Dresse's initial conditions with contact theory (Everett and Onu, 2013; Christ and Kauff, 2019) and the concept of *resource apolitization* (Zikos et al., 2015), to finally label them according to defined levels of intergroup contact. Intergroup contact, as defined by Christ and Kauff, is "direct, extended, vicarious or imagined contact between members of different groups" and is "an effective

means to reduce mutual prejudice and increase trust and forgiveness" (2019). In other words, it is the capacity of a group to perceive the 'other' group as a legitimate and valuable interlocutor (Everett and Onu, 2013). Tobias Ide defines the lack of intergroup contact as *negative othering*, which can typically generate motive and justification for the use of violence (Ide, 2015). Moreover, *political resources* are those resources that are considered 'securitized' and for which exceptional measures, including war, to mitigate an existential threat to access are legitimized (Zikos et al., 2015). Three cohesion levels characterizing the relationship between conflict parties are thus introduced by our framework: 'deeply divided societies', 'tolerated societies' and 'power symmetrical societies'. For each of these intercommunal contact conditions, distinct climate action programming mechanisms can be considered suitable, since according to the rationale of this framework, conflicting parties should address shared climate challenges in different ways – or through different pathways – at different degrees of intergroup cohesion and resource politization level.

Deeply divided societies are characterized by a complete lack of intergroup contact, meaning that a group or a conflicting party does not recognize the other one as a legitimate interlocutor. Such societies share climate impacts but lack the cohesion capacity and willingness to jointly face such issues: the cost of cooperation is too high for conflicting parties and shared resources are highly politicized. Technocratically coordinated climate action programs that minimize trans-boundary contacts and dialogue are suited when transboundary tensions are severe: they can induce intergroup contact and lead to an absence of violence, the very least form of peace (Dresse et al., 2019; Carius, 2006a; Johnson et al., 2021). In deeply divided societies, such climate-peace pathways can reduce climate-led resource degradation and scarcity and strengthen livelihoods' capacity to cope with climate stressors while initializing intercommunal contact. These practices are here labeled as technocratic climate action mechanisms since they are coordinated neutrally by a third party that actively engages each conflicting party separately, and are achieved through economic development, building institutions, building trust and cooperation and resource sustainability (Johnson et al., 2021).

Tolerated societies share biophysical environments enabling direct contact between them, although shared resources may be politicized. Programs that create neutral spaces of interaction through dialogue and negotiation are suited when conflicting parties can recognize each other as legitimate interlocutors: they can foster trust, stability, and shared identities (Dresse et al., 2019; Barnett et al., 2007; Harwell, 2016, Johnson et al., 2021). In tolerated societies, these climate-peace pathways are strategies that reduce resource uncertainty and strengthen livelihood adaptive capacity, while reducing intercommunal power asymmetries and increasing trust. These practices are here labeled as climate action for conflict resolution since they strive to resolve conflicts by creating opportunities for intercommunal dialogues, and are achieved through enhancing knowledge, building trust and cooperation, and building institutions (Johnson et al., 2021).

Finally, we define the least hostile dynamics as power symmetrical societies, characterized by a lack of intercommunal disparities in wealth, power and negotiating capacity between parties and by apolitical shared resources. Apolitical resources are those that do not constitute a reason for threats. Programs that enable the management of common-pool resource through collective action are suited when there are no intercommunal disparities in negotiating capacity: they can improve equity and substantial integration in power symmetrical societies, leading to positive peace conditions (Dresse et al., 2019; Vallet, 2020; Carius, 2006b; Zikos et al., 2015; Johnson et al., 2021). Positive peace is defined as the absence of exploitation of human and non-human resources, gender equality, and human rights respect (Devere,

2018). When no intercommunal disparities persist, intracommunal and gender-based inequalities and insecurities can be more effectively addressed. In power symmetrical societies, these climate-peace mechanisms are strategies that reduce structural intersectional inequalities and strengthen livelihood transformative capacity while fostering collective action. These practices are here labeled as climate action for conflict transformation since they strive to reduce unequal resource distribution and opportunities while shifting reasons for conflict into reasons for cooperation. Climate action through these mechanisms improves peace and resilience by shifting the relationship between parties from political borders to resilient socio-ecological systems and are achieved through enhancing knowledge, building institutions and resource sustainability (Dresse et al., 2019; Johnson et al., 2021).

### *Climate-Peace Pathways*

The CPF features three distinct pathways linking initial conditions and desirable peace dimensions: technocratic climate action, climate action for conflict resolution, and climate action for conflict transformation (figure 2). They arise from a combination of trajectories introduced by current environmental peacebuilding discourses (Dresse et al., 2019; Johnson et al., 2021), which were translated to represent climate action programming efforts rather than environmental management practices. Additionally, the capabilities dimension of peace introduced by Johnson and colleagues was left out of the frame, as we deemed more appropriate the inclusion of capacity building factors within each peacebuilding pathway. This was done by integrating capacity and resilience building features into the remaining climate-peace pathways, as enhancing community resilience to climate-related threats is a crucial factor of any climate action (von Lossow et al., 2021).

In resilience discourses, absorptive, adaptive and transformative capacities are central to socioecological resilience (Folke et al. 2010). Absorptive capacity is meant as “the capacity to take intentional protective action and to cope with known shocks and stress” and is relevant in precarious and volatile circumstances (Jeans et al., 2019 p3; Folke, 2016). Adaptive capacity is meant as “the capacity to make intentional incremental adjustments in anticipation of or in response to change, in ways that create more flexibility in the future” and is relevant to changing and unpredictable circumstances (Jeans et al., 2019 p4; Folke, 2016). Transformative capacity is meant as “the capacity to make intentional change to stop or reduce the causes of risk, vulnerability, poverty, and inequality, and ensure the more equitable sharing of risk so it is not unfairly borne by people living in poverty or suffering from discrimination or marginalization” and is relevant to address the root causes of inequality and vulnerability (Jeans et al., 2019 p5; Folke, 2016). These resilience components were fitted into the CPF since they represent tangible and actionable factors for social and ecological peacebuilding as well as for capacity building through climate action, based on different resilience-related needs (coping, adaptive or transformative).

The peace-contributing potential of climate-peace pathways is determined by a set of mechanisms encompassing the ways through which environmental management could be linked to peacebuilding outcomes (Johnson et al., 2021; Ide, 2019). Figure 2 lists this set of climate-peace mechanisms and helps conceptualizing how these mechanisms relate to the pathways: they represent tangible ways through which these pathways can lead to different dimensions of peace. Most of the mechanisms that appear on the figure are theoretical environmental peacebuilding mechanisms retrieved from the framework introduced by Johnson and colleagues; whilst ‘building capacity and resilience’ was hereby added. The approach presented here proposes to define, for each climate-peace pathway, the critical mechanisms to

increase the context-specific peace-contributing potential, as reported in the environmental peacebuilding literature.

To achieve the absence of violence and induce intergroup contact in deeply divided societies, technocratic and coordinated action that identifies the needs of both high and grass-root levels is the most suitable strategy (Dresse et al., 2019). Such action must strive to build economic development, build institutions, build trust and cooperation, build capacity and resilience and to contribute to resource sustainability (Acemoglu & Robinson, 2012; Jensen & Lonergan, 2012; Johnson et al., 2021; Milburn, 2012; Naoufal, 2014). In terms of climate action in the field of rural development, such characteristics translate into programming efforts that address urgent climate impacts on production and livelihood systems while minimizing transboundary dialogue: technocratic climate action.

To achieve stability and power symmetry while creating shared identities in tolerated societies, actions striving to create neutral spaces for dialogue are suitable strategies as they allow for negotiation and to reduce uncertainty (Dresse et al., 2019). Such actions must strive to enhance knowledge, enhance resource sustainability, build institutions, build trust and cooperation and to build capacity and resilience (Burt & Keiru, 2011; Carius, 2006a; Ide, 2019; Johnson et al., 2021; Huda, 2021). In terms of climate action in the field of rural development, such characteristics translate into programming efforts supporting adaptation to known climate impacts on production and livelihood systems while fostering conflict parties' interaction through negotiation: climate action for conflict resolution.

To achieve substantial integration, equity and sustainability, initiatives emerging from both high-level and grassroots figures that foster collective action and common-pool resource management are the most suitable strategies (Dresse et al., 2019). These initiatives must build economic development, institutions, capacity and resilience, enhance knowledge and foster resource sustainability (Krampe, 2016; Johnson et al., 2021). In terms of climate action in the field of rural development, such characteristics translate into programming efforts supporting communities in facing climate changes synergistically and as integrated social-ecological systems: climate action for conflict transformation.

### *Climate-Peace Mechanisms and sub-Mechanisms*

To pursue climate-resilient peace, the CPF introduces six climate-peace mechanisms: economic development, building institutions, building trust and cooperation, resource sustainability, enhancing knowledge and building capacity and resilience. These climate-peace mechanisms are the ways through which climate adaptation can unify conflicting communities against shared insecurities and work towards climate resilient peace. The climate-peace mechanisms translate how different characteristics of climate action interventions can mitigate conflict drivers, such as by strengthening livelihoods, improving resource governance, and addressing inequality and environmental degradation. They can be conceptualized as the means through which conflict drivers can be addressed in order to attain climate resilient peace.

In the adapted framework, mechanisms represent climate actions' contributions to peace and stability in terms of several crucial factors for security that arise from the literature: livelihood climate resilience, natural resource access, intercommunal group cohesion, institutions, trust and cooperation, economic development, resource sustainability and enhancing knowledge. Building on these factors, climate-peace mechanisms were further elaborated to characterize more specifically the ways through which they could be achieved for each climate-peace pathway through the identification of sub-mechanism (table 1). Thereafter, these sub-mechanisms were qualified with more tangible indicators characteristic of

agricultural climate action programs and practices across value chains with the potential to address and counteract intercommunal conflict drivers and avoid maladaptation (table 2).

***Table 1: Sub-mechanisms identified for each climate-peace pathway***

| | Technocratic Climate Action | Climate Action for Conflict Resolution | Climate Action for Conflict Transformation |
|---|---|---|---|
| **Economic Development** | Create livelihoods and sustain existing ones | Develop bi-communal spaces and infrastructures | Foster the provision of public goods and services |
| **Building Institutions** | Enhance institutional capacities for good environmental governance | Facilitate legal pluralism and resource rights | Foster equitable distribution of resources and benefits |
| **Building Trust and Cooperation** | Involve both high and grass-root levels while minimizing transboundary contacts | Foster intercommunal trust and shared identity | Enhance social cohesion and empower vulnerable groups |
| **Resource Sustainability** | Restore degraded ecosystems | Foster adoption of practices for sustainable use of resources | Conserve ecosystems and common-pool resources |
| **Enhancing Knowledge** | Raise awareness on environmental issues and environment-conflict linkages | Establish the recognition of diverse ontologies in climate adaptation and NRM | Foster recognition of alternative knowledges and worldviews |
| **Building capacity and resilience** | Increase livelihood climate coping capacity | Increase livelihood climate adaptation capacity | Increase livelihood climate transformative capacity |

## Economic development

The same way that NRM plays a significant peacebuilding role in contributing to economic development, climate adaptation presents economic opportunities by enabling increased yields and returns, providing people with diversified livelihoods and sources of income, preventing risks, and increasing available resources through preventing losses (Ramirez-Villegas et al., 2021, Williams et al., 2020). To achieve the absence of violence, climate action's contribution to economic growth revolves around addressing basic human needs, and thus creating livelihoods and sustaining existing ones (Jensen & Lonergan, 2012; Bruch et al., 2016). Examples of ways through which climate action contributes to creating and sustaining livelihoods include securing food production, providing necessary inputs, diversifying income, spreading operations, identifying opportunities for added value and restoring degraded infrastructures. To establish shared identities while contributing to economic growth, climate action has the potential to create neutral spaces for dialogue by establishing bi-communal infrastructures. For instance, developing shared collecting, storing, processing and transporting facilities and facilitating access to intercommunal resources can increase livelihoods' economic capacities while creating opportunities for groups to perceive mutual interests and identities. To achieve substantial integration, it is crucial to extend climate action's economic benefits across all groups, especially more vulnerable ones. The sub-mechanism through which climate action contributes to peace via economic development is thus fostering the provision of public goods and services (Krampe, 2016). Examples of practices include monitoring funds allocation, increasing availability of extension services, increasing government revenues from NRM and fostering foreign investment. By contributing to economic growth, these sub-mechanisms characterize climate action program's features that may develop economic capacities and contribute to peacebuilding.

## Building institutions

An essential component of environmental peacebuilding activities is the development of institutional capacity to improve natural resource governance (Ide, 2019). To achieve the absence of violence, climate action's contribution to improved institutional capacities requires programs to strengthen the rule of law; enhancing institutional capacities for good environmental governance is thus a critical factor (Acemoglu & Robinson, 2012). Activities for this sub-mechanism include addressing the illicit use of natural resources, addressing the conflict economy such as by reducing corruption and promoting transparency, as well as building NRM governance, institutions, and capacities, such as by involving local authorities in the

administration of the program. Setting seed for legal pluralism and resource rights through climate action programs can resolve conflicts and lead to shared values, particularly since the direct dialogue and negotiation can create a sense of interdependence between actors (Dresse et al., 2019). This can be done by securing property rights, addressing legal ambiguities on natural resource tenure and rights, certifying resource rights and setting conditions for communication and negotiation around resources. To reach substantial integration, fostering equitable distribution of resources and benefits is a key institutional peacebuilding mechanism (Johnson et al., 2021). As a matter of fact, creating policies, standards, and procedures that encourage group action and cooperative resource management can improve the agency of socially marginalized groups and result in fairer distribution of resource benefits (Ostrom, 1990). Climate action programs can incorporate such goals by regulating the use of and rights to resources more effectively and equitably and ensuring that program benefits are evenly distributed across groups. This can be done by making tenure governance policies more inclusive, strengthening links between formal and informal NRM systems and involving all actors and beneficiaries through the development of the program to increase transparency. By contributing to building institutions, these sub-mechanisms characterize climate action program's features that may develop governance and contribute to peacebuilding.

### Building trust and cooperation

Climate-smart agricultural practices, technologies and services can serve as opportunities to build cooperation. In the same logic that NRM strategies present opportunities to build cooperation, integration and peace, climate adaptation strategies can create circumstances for building trust and cooperation, which ultimately positively affect peace. Indeed, one of the most frequently reported mechanisms for peacebuilding is supporting the development of trust and cooperative capacities (Johnson et al., 2021). Building trust and cooperation in violent contexts characterized by deeply divided societies can be achieved through minimizing transboundary contacts while providing communities with climate adaptation support responding to specific needs of both high and grass-root levels. In this sense, climate adaptation initiatives that meaningfully involve relevant community stakeholders, particularly climate vulnerable and conflict-affected households, in the program's planning and administration processes, while still minimizing dialogue between conflict parties, have a chance at mitigating conflict potentials and creating a sense of interdependence. Participatory Rural Appraisal Strategies would be a relevant example for this as they strive to incorporate the knowledge, opinions and needs of rural populations in the planning and management of development programs (FAO, 2006). In tolerated societies it is important to foster shared identities and intergroup contact to build trust, which can be done by enabling groups to perceive climate change as a common challenge that must be addressed collaboratively. Proxies for this sub-mechanism include the establishment of neutral spaces for interaction and dialogue and addressing intercommunal power imbalances. This can be translated into activities gathering program beneficiaries to analyze, collaborate, and find creative solutions for climate challenges, as well as involving moderators in project plans. Another important aspect is to consider for building trust is the reduction of power asymmetries, meaning that programs should strive to support communities through equity-based approaches, and foster the recognition of mutually legitimate rights (Carius, 2006). Additionally, achieving substantial integration through building trust and cooperation requires the enhancement of social cohesion and the empowerment of vulnerable groups. As a matter of fact, increasing social capital and strengthening networks creates opportunities for improving levels of agency and capabilities (Hellin et al., 2018). Examples for this sub-mechanism include enabling communities to produce collective benefits, such as through cooperatives, creating opportunities for shared outputs, increasing social capital in

cooperative arrangements and networks, involving vulnerable groups in decision making processes, such as women, youth, marginalized, and disabled, and addressing gender-based discrimination. Acquiring a gender-sensitive approach in climate adaptation practices is crucial to enable veritable integration with a view to build trust and cooperation. This can be achieved by including protocols to address gender-based violence, providing guidelines for reporting and confidentiality, as well as following criteria for evaluating whether a gender-responsive approach is used in CSA practices (Nelson & Huyer, 2016; Twyman et al., 2017).

### Resource sustainability

Climate smart agriculture has the potential to contribute to resource sustainability, since its implementation often supports the maintenance and conservation of healthy and productive landscapes. For instance, agroforestry, including farmer-managed natural regenerations, and soil and water conservation technologies, such as zai, half-moon, tie, contour ridges and conservation agriculture, are renowned CSA practices applied to regenerate ecosystems (Partey et al., 2018). In addition, nature conservation and the protection of forest areas also make part of climate action programming packages, therefore leading to more sustainable ecosystems and landscapes. Since sustainable environments are essential cornerstones for peace, particularly for social groups whose livelihoods are directly dependent on their ability to access resources, CSA practices represent opportunities for peacebuilding by improving resource availability and environmental conditions (UNEP, 2003; UNEP, 2009; Johnson et al., 2021; Bruch et al., 2016). In post-conflictual or violent contexts, it is critical to avoid future conflict relapses over scarce natural resources and it is therefore crucial to employ restoration frameworks for degraded landscapes and ecosystems to increase availability and quality of water and land resources. Adopting CSA practices that foster NRM and regeneration, while also limiting unsustainable exploitation can assist communities in maintaining stable livelihoods and fostering human security (Milburn, 2012; Hellin et al., 2018). Natural resource conservation and protection strategies can also support the development of shared identities as well as substantial integration. For instance, to achieve shared identities, climate action programming packages can include agricultural practices for sustainable use of resources, which can support durable resource availability for communities and therefore secure livelihoods' stability, while also incorporating practices for landscape restoration. Indeed, formerly conflicting actors within landscapes can gain a sense of belonging and a rooted identity through the sustainable use or restoration of those landscapes (Burt & Keiru, 2011; Johnson et al., 2021). Example for this sub-mechanism include increasing natural capitals through recycling resources and regenerative agricultural practices, promoting diversity in production systems through increasing diversity at the landscape scale and spatially diversifying production systems with polycropping, as well as creating bicommunal spaces for landscape restoration. Additionally, climate action programs can contribute to achieving substantial integration in power-symmetrical societies by facilitating community-based conservation of ecosystems and common-pool resources. For this to happen, it will be critical to at least facilitate the protection of ecosystems and biodiversity, such as by identifying local resources at risk, assessing ecosystem services of valuable resources and planning conservation efforts for these species at risk. However, what will be particularly effective for peacebuilding is to meaningfully involve communities in the definition and development of protected areas, and NRM projects more broadly, to address the needs of all resource users and prevent the exclusion of marginalized groups.

### Enhancing knowledge

Education, environmental awareness, and the recognition of various knowledges are all critical factors in peacebuilding since they can foster social inclusion, equity and enhance capabilities (Lederach, 2017; McAllister & Wright, 2019; Johnson et al., 2021). Climate action can positively impact peacebuilding by providing opportunities to promote alternative worldviews and by integrating a diversity of traditional and cultural ontologies in program designs. In deeply divided societies, climate action programs can contribute to peace through educational and awareness-raising activities around nature conservation (Naoufal, 2014). Providing communities with technical knowledge about NRM and how to restore degraded or dwindling natural resources can help them preserve them on their own and meet their needs (Jensen & Lonergan, 2012). This is especially important for more vulnerable and marginalized groups, such as minorities, displaced and indigenous peoples, whose livelihoods rely on these resources and who may have fewer capacities and instruments to access them independently. Also, since climate change is difficult for people to fathom because it is abstract, often invisible, and slow onset, it is of great relevance to raise awareness over its implications over natural resource availability (Naoufal, 2014). The same way that strengthening resource sustainability through restoration efforts can reduce the potential for conflicts over resources, learning and obtaining the tools to preserve scarce natural capital and comprehend the risks posed by climate change represents an opportunity for peacebuilding. In addition, post-conflictual communities will benefit from awareness raising initiatives around environment and conflict linkages which have proven to empower positive change (Naoufal, 2014; Johnson et al., 2021). Moreover, facilitating environmental education while fostering different ontologies around environmental resources has been shown to create shared identities and acceptance of 'the other' as a legitimate user of shared landscapes (Huda, 2021). In this sense, recognizing alternative knowledges and worldviews has the potential to de-politicize and de-securitize common-pool resources, therefore increasing intergroup contact (Everett & Onu, 2013; Christ and Kauff, 2019; Zikos et al., 2015). For instance, grassroots educational activities proved to have the potential to mitigate the effects of ethno-nationalistic populism and contribute to the creation of a societal climate supportive of sustainable reconciliation in the long term (Huda, 2021; Ide & Tubi, 2020). Establishing the recognition of diverse ontologies in climate adaptation and NRM seems therefore of extreme relevance for peacebuilding. By fostering intergroup contact and social inclusion, this process can contribute to both shared identities and substantial integration. Examples for this sub-mechanism include co-designing climate adaptation programs with local communities to integrate all existing practices on the ground, including the knowledge of women and men who manage the habitat to meaningfully integrate existing local climate adaptation and NRM strategies (Elias, 2018), valuing traditional and indigenous knowledge and providing knowledge sharing opportunities amongst groups.

### Building capacity and resilience

Capabilities are a key element for peacebuilding and human security since they represent options and instruments to face, mitigate and adapt to threats posed to human, environmental and social rights (Johnson et al., 2021; Barnett & Adger, 2007; Nussbaum, 2011; Peters et al., 2020). Climate smart agricultural practices, by providing tools, services and strategies for climate adaptation, contribute to increasing capabilities through building communities' capacity and resilience to withstand climate shocks and slow onset climate impacts. For this climate-peace mechanisms, the three capabilities building blocks of socioecological resilience led the definition of appropriate sub-mechanisms for the different initial conditions outlined above: perseverance, adaptability and transformability (Folke et al., 2010; Folke, 2016; Jeans et al., 2019). In contexts affected by tensions, it is of great relevance to provide communities

with the capacities to cope with climate shocks and persevere their livelihoods while undergoing stress, in order to prevent conflict relapses over resources. For this, it is essential for climate action programs to identify current local assets and needs, provide social protection schemes to strengthen post-conflict human capital, decrease sensitivity of risk exposed areas and strengthen production systems coping capacity to shocks, such as by spreading farm operations, diversifying produce, adjusting cropping and harvesting times, developing storage capacities and facilitating the adoption of insurance-based schemes. To strive for shared identities, it is essential for climate action programs to support communities with adapting their livelihoods to climate, in terms of both productive and social systems. Increasing the adaptation capacity of production systems will require facilitating the adoption of adapted crops, cultivars and animal type, improving crop residue management, integrating mixed production systems, and increasing access to collection, refrigeration, processing and transportation infrastructures. On the other hand, increasing the adaptation capacity of social systems will require strengthening social capital, such as networks and connections, and financial capital to expand capacities to grow production systems and increase land-tenure security. Finally, to strive for substantial integration, climate action programs need to provide communities with the transformational capacities to address the root causes of poverty and inequality. This requires strengthening the agency of vulnerable groups, engaging women and youth in long-term change processes that shift power, beliefs and values (Jeans et al., 2019). Also, to increase capabilities, it will be important to ensure food sovereignty such as by developing and informing policies and approaches that allow communities to decide the way food is produced, traded, and consumed.

***Table 2: Overview of climate-peace mechanisms, sub-mechanisms and examples of related climate action program activities***

| Mechanisms | Sub-mechanisms | Indicators and examples |
|---|---|---|
| Economic development | Create livelihoods and sustain existing ones | **Secure food production:** provision of necessary inputs, irrigation sources, climate information<br>**Diversify income and livelihood:** spread farm operations, mixed-systems approach, analyze market value chains to address bottlenecks and identify opportunities for added value<br>**Restore degraded infrastructures**: sustain/introduce irrigation systems, mechanization technologies |
| | Develop bi-communal spaces and infrastructures | **Introduce intercommunal infrastructures**: develop shared collecting/ storing/ processing/ transporting facilities for produce<br>**Facilitate access to intercommunal resources**: extend fallow areas/pastures |
| | Foster the provision of public goods and services | **Bolster equitable and efficient delivery of public services:** monitor funds allocation, increase availability of extension services<br>**Increase government revenues from natural resource management:** increase available resources for the provision of public goods and services, foster foreign investment |
| Building institutions | Enhance institutional capacities for good environmental governance | **Address the illicit use of natural resources:** monitor protected areas/resources<br>**Address the conflict economy:** reduce corruption, promote transparency<br>**Build natural resource management governance, institutions, and capacities**: fortify subnational institutions, involve authorities in administration of program |
| | Facilitate legal pluralism and resource rights | **Secure property rights:** map properties, address legal ambiguities on natural resource tenure and rights, certify resource rights<br>**Deploy effective conflict management and resolution processes:** facilitate communication and negotiation around resources |
| | Foster equitable distribution of resources and benefits | **Regulate the use of and rights to resources more effectively and equitably:** make tenure governance policies more inclusive, transparent, and fair, strengthen the links between formal and informal natural resource management systems, reform natural resource management policies<br>**Ensure program benefits are evenly distributed across groups:** all relevant actors concerned are made aware of the project and its benefits |
| | Involve both high and grass-root levels while minimizing transboundary | **Involve all community stakeholders in planning process:** meaningfully involve relevant community stakeholders (climate vulnerable and conflict-affected households) in the program's planning and administration processes, engage informal sector in program |

| | | |
|---|---|---|
| Building trust and cooperation | contacts in violent contexts | development<br>**Decrease opportunity cost for conflict:** address needs of both high and grass-root level figures in all groups targeted by the program, identify root causes of intercommunal conflict through participatory rural appraisal strategies<br>**Participatory approach through minimized transboundary dialogue**: ensure participatory approaches do not gather program beneficiaries involved in active (violent) conflict together |
| | Foster intercommunal trust and create shared identities | **Address intercommunal power imbalances**: address disparities in wealth and negotiating capacity, support beneficiary communities through equity-based approaches rather than egalitarian ones<br>**Create neutral spaces for dialogue:** gather program beneficiaries to analyze, collaborate, and find creative solutions for climate challenges, involve moderators in project plans<br>**Foster the recognition of mutually legitimate rights** |
| | Enhance social cohesion and empower vulnerable groups | **Foster cooperative behavior:** enable communities to produce collective benefits, strengthen cooperatives, create opportunities for shared outputs, increase social capital in cooperative arrangements and networks<br>**Involve on vulnerable groups in decision making processes:** include women, youth, marginalized, and disabled in program design and administration<br>**Address gender-based discrimination:** include protocols to address gender-based violence, provide guidelines for reporting and confidentiality |
| Resource Sustainability | Restore degraded ecosystems | **Avoid future conflicts over scarce natural resources:** employ restoration frameworks for degraded landscapes and ecosystems, increase access to, availability and quality of water and land resources<br>**Limit unsustainable exploitation:** develop and expand protected areas, track and report deforestation and landscape degradation practices |
| | Foster adoption of practices for sustainable use of resources | **Increase natural capital:** recycle resources, regenerative agricultural practices<br>**Promote diversity in production systems:** increase land-use diversity or diversity at the landscape scale, Sustainable shifting cultivation, management of heterogeneous landscape, promote spatially diversified production systems through polycropping, promote rotational and regenerative grazing to improve soil quality and forage yield<br>**Create bicommunal spaces for landscape restoration:** meaningfully involve communities in the planning of bi-communal NRM projects (dams, forest conservation…) |
| | Community-based conservation of ecosystems and common-pool resources | **Protect ecosystems and biodiversity:** identify local resources at risk (endangered/ vulnerable species), identify ecosystem services of valuable resources (cultural, provisioning, regulating, supporting services), plan conservation efforts for such resources<br>**Establish conservation committees**: meaningfully involve the community in the definition and development of protected areas, and NRM projects more broadly, to address the needs of all resource users and prevent the exclusion of marginalized groups |
| Enhancing knowledge | Raise public awareness and increase learning opportunities | **Provide technical knowledge on natural resource management**: tools, workshops and learning opportunities to help communities preserve dwindling or scarce resources<br>**Provide learning opportunities and tools** to comprehend the risks posed by climate change, especially regarding slow onset processes<br>**Increase public awareness to address violent conflict:** environmental educational activities to develop sustainable and diversified livelihoods on environmental issues and environment-conflict linkages |
| | Establish the recognition of diverse ontologies in climate adaptation through grassroots approaches | **Co-design programs to integrate local knowledges**: meaningfully involve local groups' representatives in the planning of the projects to integrate all existing local climate adaptation and natural resource management strategies in the program, ensure diverse knowledge holders, including both men and women, have equal voice and that their strategic interests are addressed<br>**Value traditional and indigenous knowledge:** seek to include traditional practices and customs in program development and recognize the legitimacy and value of indigenous and local knowledge<br>**Provide knowledge sharing opportunities**: plan workshops and other community-engaging activities for different groups to share their traditional practices and beliefs in place to manage natural resources and adapt to climate changes |
| Building capacity and resilience | Increase livelihood climate coping capacity | **Identify local assets and needs:** understand impact of conflict and climate on livelihoods and production systems, provide social protection schemes to strengthen post-conflict human capital (health, nutrition, education, employment)<br>**Decrease sensitivity of risk exposed areas:** include sensitivity analyses, identify maladaptive livelihood strategies based on sensitivity, provide early warning systems<br>**Strengthen production systems coping capacity to shocks:** spread farm operations and diversify produce, adjust cropping/harvesting times, develop storage capacities, facilitate adoption of insurance-based schemes |

| | | |
|---|---|---|
| | Increase livelihood climate adaptation capacity | **Increase adaptation capacity of social systems:** strengthen social capital (networks and connections) and financial capital to expand capacities to grow production systems (e.g.: financial services, credits), increase land-tenure security, address instrumental needs of communities<br>**Increase adaptation capacity of production systems:** facilitate the adoption of adapted crops/ cultivars & animal types/ breeds, improve crop residue management, integrated nutrient management, provision of post-harvest storage and water harvesting structures, mixed production systems, increase access to collection, refrigeration, processing and transportation infrastructures |
| | Increase livelihood climate transformative capacity | **Address root causes of poverty and inequality:** strengthen sense of agency of vulnerable and marginalized groups, engage women and youth in long-term change processes that shift power, beliefs, values and ways of thinking and behaving to support greater levels of justice and equality<br>**Equity, dignity, inclusion:** support fair, dignified and inclusive livelihoods for all actors engaged in food systems, especially small-scale food producers<br>**Promote food sovereignty:** developing and informing policies and approaches that allow communities to decide the way food is produced, traded and consumed |

# 4. Drivers of conflict and insecurity

To create a conflict-sensitive and peace-responsive programming tool, it is relevant to remind ourselves of the difference between conflict-sensitivity and peacebuilding. According to van Brabant, conflict sensitivity minimizes negative and maximizes positive impacts of programming on conflict, while peacebuilding seeks to reduce key drivers of violent conflict and to contribute to broader societal-level peace (2010). The previous section detailed through a theoretical framework how climate-peace mechanisms can be tailored to address different intergroup contact 'initial conditions'. Various aspects of climate adaptation programming were systematized to minimize conflict relapses in deeply divided societies, therefore sustaining negative peace, while other ones were systematized to maximize shared identities, social cohesion, and substantial integration, therefore striving for positive peace. In this sense, the CPF is built on conflict-sensitivity foundations. For a programming tool to also adopt peace-responsiveness, it must be useful in addressing contextual drivers of conflict and insecurity. This section outlines pertinent drivers of conflict and insecurity, while also linking them to the climate-peace mechanisms introduced in the CPF. This section firstly outlines the set of indicators that were selected to characterize drivers of conflict and insecurity, and it then proceeds on linking them to climate-peace mechanisms in order to define the fragility risk factors that these mechanisms can directly address.

## *Contextualizing insecurity and conflict drivers through crisis risk models*

The purpose of the CPF is to provide a conceptually and theoretically useful scheme linking climate adaptation and peacebuilding, with the end goal of formulating a practical tool capable of prioritizing peace-responsive mechanisms to address contextual drivers of insecurity when designing climate interventions. To characterize local conditions of insecurity and the propensity of a context to be affected by conflict drivers, the concept of risk appears as appropriate as it holistically evaluates the potential for adverse effects on humans and socio-ecological systems (Simpson et al., 2021; Borodzicz, 2005). Specifically, the concept of humanitarian crisis risk is relevant in assessing security-related implications on communities as it can inform on the specific factors leading to more fragile conditions by assessing people's vulnerability and exposure to a wide array of shocks, while also considering their system's capacity to cope with these shocks (Borodzicz, 2005; Maskrey et al., 2022). Understanding the likelihood of various social, economic, political, and environmental disaster risk factors in affecting the viability of communities and causing humanitarian crises via complex feedback loops also helps appraising context-specific threats to human security (Maskrey et al., 2022; Simpson et al., 2021; Stein & Walch, 2017).

Humanitarian crisis risk models are particularly relevant in the field of climate security as they assess threats to humans' wellbeing from a systemic approach while taking into account the complexity of the interlinkages between natural and socio-political vulnerability factors, leading to fragility and in some cases to conflict (Borodzicz, 2005; Simpson et al., 2021; Stein & Walch, 2017).

The crisis risk model introduced by the Joint Research Center of the European Commission, INFORM Risk, offers a solid foundation for contextualizing conflict and insecurity drivers in various geographies, as well as the severity of their implications. It introduces six categories of risk for humanitarian crises, namely natural hazards, human hazards, socio-economic vulnerabilities, vulnerable groups, lack of institutional coping capacity and lack of infrastructural coping capacity (Marin-Ferrer et al., 2017). These risk categories can effectively be used to estimate the propensity for insecurity and conflict since the indicators comprising them inform on different dimensions of societal fragility. For instance, exposure to droughts, floods and other natural hazards indicators, can indicate the predisposition to natural resource scarcity, reduced agricultural outputs and food insecurity, which are commonly recognized drivers of conflict as they can lead to competition and disputes over resources (Liebig et al., 2022; Bora et al., 2011). Also, these indicators inform on more sudden onset natural disasters too, such as floods and cyclones, phenomena that have been linked to increased migration and displacement flows often leading to instability and conflict (Kriege, Panke & Pregernig, 2020; Thalheimer & Webersik, 2020, Peters et al., 2020). INFORM's socioeconomic vulnerabilities category provides information on the extent to which poverty and inequalities are pressuring in a given locality, therefore capturing grievance-related drivers of conflict (Kett & Rowson, 2007). The vulnerable groups risk category appraises levels of domestic food price levels and volatility, food insecurity, the prevalence of undernourishment, rates of child mortality and diseases-related mortality, and the number of refugees and displaced people, being factors indicating levels of exclusion and marginalization, as well as insurrection, which all can lead to insecurity (Stein & Walch, 2017; Walch, 2018; Bora et al., 2011; Thalheimer & Webersik, 2020). Additionally, the model's risk category on the lack of institutional coping capacity is composed of indicators defining governments' effectiveness and corruption as well as their capacity to cope with disasters and shocks. Poor institutional capacity to cope with shocks is widely recognized as a conflict and insecurity driver, as institutional and political landscapes determine whether economic, agricultural and climate-driven shocks lead to conflict (Liebig et al., 2022; Koubi, 2018; Forsyth & Schomerus, 2013). INFORM's risk category on the lack of infrastructural coping capacity provides an overview of communities' capacity to access public services, therefore indicating the infrastructural and economic viability of the localities they pertain (Marin-Ferrer et al., 2017). Low economic and infrastructural capacity to cope with shocks, and more broadly economic hardship, provide indications on poverty levels which are often ingrained with other factors interconnected with conflict (Liebig et al., 2022). Lastly, the human hazards risk category informs on the projected risk of conflict as well as its intensity, therefore evaluating the actual risk of conflict and the potential tensions there may be in given locations.

The set of INFORM risk categories developed by JRC can be deemed as appropriate and comprehensive to capture drivers of insecurity and potential conflicts, as they holistically address the variety of factors that may lead to crises. In addition, these indicators are of extreme relevance for contextualizing the specific risks posed to different geographies as they provide global data at regional level (admin 1), and in some cases even at the municipality level (admin 2). In addition, they are particularly useful for the purpose of developing a tool since the extent to which each risk category is relevant in a location is given through a risk score out of ten, and by providing risk thresholds. The data provided by these indicators

can be efficiently adopted to characterize which drivers of conflict are present in different regions, as well as the extent to which these drivers are worrisome.

## *Linking drivers and climate-peace mechanisms*

### Natural hazards

According to the INFORM methodology, the Natural Hazard dimension reflects the probability of physical exposure to different natural hazards (Marin-Ferrer et al., 2017). The natural hazards considered are earthquakes, tsunamis, floods, tropical cyclones, and drought.

Discussions around the links between natural hazards and conflict are prevalent in the literature. Nel and Righarts (2008) and Nardulli et al. (2015) are just two examples of studies which discuss the connection. Natural hazards can lead to resource scarcity and heighten imbalances in access to resources. This may deepen existing grievances, amplifying tensions between groups. Drought, for example, leads to water scarcity and diminish suitable pastureland for grazing in rural communities. This can result in conflict amongst pastoral communities, as has been well documented in Kenya (Njiru, 2012). Furthermore, tensions may be amplified by unequal distribution of aid after a natural hazard, or protective measures beforehand. The findings in de Juan et al. (2020), which analyzed aid distribution and social conflict in the aftermath of the earthquake in Nepal, illustrates this point. The findings suggested that the more aid distributed, the more the conflict-mitigating effects of the earthquake, such as community solidarity, were weakened. In addition, the study found that aid can amplify pre-existing social inequalities, and by extension social conflict. Natural hazards, through their impacts on livelihoods, have also been reported as encouraging individuals to join armed groups as an alternative source of income (van Baalen and Mobjörk, 2018). The study suggests that individuals who cannot sustain themselves or their families through agriculture may join an armed group, identifying this as one of the major mechanisms linking climate-related environmental change with conflict in East Africa. This mechanism has also been identified in Iraq (Hassan et al., 2018), another population largely dependent on rain-fed agriculture, and India (Wischnath and Buhaug, 2014). Finally, weak governmental institutions and responses to natural hazards can be a factor in conflict (Harris et al., 2013). If the governance structures designed to ensure human security are weak, social cohesion may be undermined and lead to increased chances of instability and conflict (Vivekananda, 2011).

Considering these links between natural hazards and conflict, there are a number of related climate peace mechanisms which should be incorporated into an intervention to render it conflict-sensitive and mitigate the links discussed above. **Building institutions** is key for conflict-sensitizing interventions. Climate change risks undermine the capacity of institutions to ensure human security and may be already weakened in fragile or conflict-affected states (FCAS). Strong institutions are essential if a country is to adapt to climate shocks, and for the population to be protected, avoiding the conditions which may lead to instability, including high levels of unemployment. This links with the **economic development** climate peace mechanism. Given the impacts of climate change and conflict on livelihoods, particularly rural ones, creating and sustaining livelihoods is important for stability, and mitigating destabilizing trends often associated with external factors, such as migration and displacement. Improving **resource sustainability** could reduce the risk of instability resulting from natural hazards. These includes avoiding future conflicts over scarce natural resources through restoration frameworks, and improving access to, and availability of, resources. Finally, **building capacity and resilience** in response to climate hazards is an important

climate-peace mechanism that should be incorporated into interventions. Identifying local assets and needs and decreasing the sensitivity of exposed areas are two suggested ways to achieve this.

### Human hazards

The INFORM methodology considers Human Hazards to be either technological or sociological in nature. For example, industrial accidents with environmental impacts are considered to be technological human hazards, whereas sociological hazards include civil wars and terrorism (Marin-Ferrer et al., 2017). The methodology includes two variables within the Human Hazards dimension: conflict intensity and projected risk of conflict.

Like natural disasters, the consequences of industrial disasters have the potential to lead to conflict (Harris et al., 2013; Shrivastava, 1987). The pervasive conditions after an industrial accident (such as the Bhopal disaster), may enhance grievances and inequalities. Considering this, it's worth emphasizing how social vulnerability plays a role in determining the capacity of different groups to respond to disasters (Kramarz, 2022). Such inequality can be exacerbated by disasters, resulting in discrepancies between groups in access to aid and support during recovery. This may deepen disillusionment, and underlines the importance of institutional response to disasters, which influence the likelihood of instability triggered by a disaster. An unequal response, or one deemed to favor particular groups, is one way by which a disaster may lead to unrest and dissatisfaction. Furthermore, the industrial accident happening in the first place may lead to resentment, and dissatisfaction with governance structures and institutions. Climate investments which aren't conflict sensitive can be considered as a technological hazard. Without conflict-sensitivity adaptation projects can result in marginalization, fuel grievances or other maladaptive outcomes (Kramarz, 2022; Cao et al., 2021). Several studies examine the connection between interventions and conflict. These include Alusiola et al. (2021) studying forest management projects, and Tänzler (2013), which identified the importance of land-use and land-tenure rights in adaptation projects.

The threats posed by human hazards therefore link with several conflict-peace mechanisms. Firstly, **building institutions** is key to both ensuring an effective and equal response to a disaster. Strong institutions are likely important to reduce the chances of an industrial accident occurring, for example by ensuring strict safety guidelines and regulations. **Building capacity and resilience** is another important climate-peace mechanism, key to improving the ability of individuals impacted by such disasters to recover, without resorting to maladaptive livelihood strategies. For example, this could be achieved through providing social protection schemes. B**uilding trust and cooperation** serves as an important step to protect against conflict stemming from human hazards. This could be achieved through fostering social cohesion and cooperative behavior. The empowerment of vulnerable groups by involving them in decision making processes, for example in aid distribution post-disaster, would prevent marginalization and resentment between groups. Finally, e**conomic development** represents a further mechanism with the potential to negate the risks presented above. For example, bolstering equitable and efficient delivery of public services could mitigate inequalities between groups, from which tension can stem after a disaster. In addition, increasing government revenues, attracting foreign investment, and raising available resources for the provision of public goods and services could reduce the risk of a disaster occurring, whilst improving the capacity to respond to them.

### Socio-economic vulnerabilities

The socio-economic vulnerability category captures the demographics of a country rather than focusing on particular social groups (Marin-Ferrer et al., 2017). Based on three core components; development and

deprivation, inequality, and aid dependency, this dimension measures the ability of individuals or households to ensure overall human security and well-being. Thus, socio-economic vulnerability is not only linked to income levels but also addresses the underlying factors that cause and perpetuate low development outcomes.

While the relationship between socio-economic vulnerability and conflict escalation has been widely covered in the literature, Ide et al. (2020) observed that those interlinkages are not unidirectional. On the one hand, conflicts can intensify pre-existing structural vulnerabilities, such as economic inequalities and cultural stereotypes, or create new ones, like displacement and violence (Zhukova, 2020). They can also cause setbacks in development, impacting countries' economies and leading to weaker and less accountable institutions (Denny & Walter, 2014; Word Bank, 2022). On the other hand, structural risk factors, such as weak social services, inefficient justice systems, and a history of violence, can induce conflict (Barnett & Adger, 2007).

Literature on climate security has widely documented how climate change interacts with pre-existing insecurities to further enhance the risk of conflict (Ruttinger, 2015). Examples of this can be found in Gillmore (2017), Ide (2017), and Abrahams (2019). In sub-Saharan Africa, the conflicts in Darfur, Sudan, illustrate the complex interplay between physical, environmental, and economic vulnerability (Ide et al., 2020). For instance, the effects of climate change on agricultural livelihoods, which heavily rely on natural resources, pose threats to food security, potentially leading to conflict. Some research on climate and conflict has focused on disasters (Brzoska, 2018; Mena, 2019), defined as emergencies that occur when extreme hazards strike vulnerable socio-economic systems (Cohen & Werker, 2008). According to Siddiqi (2018) and Walch (2018), conflicts can increase vulnerability to disaster, as the provision of goods and essential services are often disrupted (Hilhorst et al., 2019). Schleussner et al. (2018) have underlined how countries identified as vulnerable to conflict outbreaks are, at the same time, emerging hotspots of future climate impacts.

Several climate-peace mechanisms can be considered to address the linkages between socio-economic vulnerability and conflicts. First, **building capacity and resilience** by increasing transformative capacities could help tackle vulnerabilities' root causes. Engaging local actors in dignified production activities could promote greater justice and inclusion. Given the harmful effects of conflict on highly vulnerable socio-economic systems, social protection schemes could reduce the low rates of human development and inequality. Second, **building trust and cooperation** is vital to enhance social cohesion, reducing political exclusion, and fostering shared identities. This could be achieved by integrating local communities and institutions into development interventions. Third, the **economic development** climate-peace mechanism is vital to avoid deepening existing inequalities and exacerbating the risks of conflict. Diversifying income and livelihoods, developing value chain infrastructure, and fostering investment are suggested ways to counteract those risks. Fourth, promoting **resource sustainability** can mitigate pressures on scarce resources and unsustainable practices that can lead to resource degradation and agricultural stagnation. Finally, **building institutions** and state capacities could reduce the application of negative coping strategies in the face of a climate catastrophe. Without a robust institutional environment, any external factor can increase the likelihood of a conflict outbreak in the short term.

### Vulnerable groups

Within a country, populations comprising vulnerable groups share particular features that make them more likely to require humanitarian aid or be denied financial, health care, and social support services

(INFORM, 2017). These may be individual characteristics, such as disabilities or illness, or the result of social, political, and environmental external circumstances. The latter can be linked to ethnic minorities, refugees and internally displaced persons (IDPs), or populations highly exposed to frequent hazards (INFORM, 2017). The degree of vulnerability is often associated with interconnected weaknesses that lead to increased risk. This intersectionality is observed, for example, in indigenous groups, who not only tend to be marginalized due to ethnic factors (social) but also live in territories that are highly exposed to climate change (environmental) and are often excluded from decision-making and the exercise of their rights (political).

Vulnerable groups face disproportionate risks during conflicts (Peters et al., 2019), as they have limited social and material resources to respond to these situations. Conflict scenarios exacerbate these vulnerabilities, for example, by affecting food security and potentially inducing forced displacement (Townsend et al., 2021). In 2021, over 139 million people lived in countries where conflict was the primary cause of severe food insecurity (GRFC, 2022). Conflicts can also destroy civilian infrastructure, restricting access to basic services and undermining human security (Sowers and Weinthal, 2021). The Yemeni War (2011-2019) illustrates how the destruction of hospitals, agricultural infrastructure, roads, and water supply systems mainly affects vulnerable populations, such as IDPs (Sowers and Weinthal, 2021). While conflicts increase the vulnerability of the most disadvantaged, the governments' biased responses to manage these crises can indirectly exacerbate existing inequalities (Hilhorst et al., 2019). For example, the cash grants disbursed by the Myanmar government to mitigate the effects of the 2015 cyclone that ravaged Rakhine ended up in the hands of the local Buddhist elite, who are not systemically discriminated against, unlike Muslim minorities (Hilhorst et al., 2019).

Conversely, increased vulnerability can also heighten the risk of conflict, especially when compounded by climate change (Brzoska & Fröhlich, 2016). According to Barnett and Adger (2007), a group's vulnerability to climate impacts is related to the extent to which they are dependent on natural resources, the extent to which these resources are sensitive to climate change, and the adaptative capacity of the group. Typically, vulnerable populations have less access to resources and less ability to anticipate and adapt to change (Carter and Kelly, 2021). This is especially visible in contexts where governments lack efficient mechanisms to protect citizens, institutions and governance structures do not enable crisis risk management, and power holders do not promote equitable resource allocation (Harris et al., 2013).

There are several climate-peace mechanisms to reduce the risks of conflicts mentioned above. As vulnerability is both material and epistemic, **enhancing knowledge** is a strong climate-peace mechanism to counteract the cultural risks of conflicts. The coexistence of several knowledge systems leads to a better understanding of the elements that can foster adaptive capability and community resilience (Rarai et al., 2022). Through the **economic development** mechanism, creating sustainable and resilient livelihoods is key to stabilizing vulnerable groups. For vulnerable farmers, this can be achieved by enabling access to formal sources of credit and climate-resilient seeds, strengthening markets, and promoting value chain development. Similarly, restoring degrading infrastructure could foster the provision of public goods and services.

Furthermore, improving **resource sustainability** could increase resilience among disadvantaged groups. In times of crisis and resource scarcity, diversifying the natural resource base, promoting climate-smart practices, and restoring degraded ecosystems are powerful strategies that can lessen conflict risk. **Building institutions** and improving governance mechanisms is crucial to enable an equitable distribution

of resources among vulnerable populations (Harris et al., 2013). In environments where the prevalence of vulnerable groups is high, strengthening the capacity of governance structures at the local and national levels is essential. Key institutions to support vulnerable farmers include regulated markets, agricultural advisory services, secure property rights, and tenure government policies (Oxfam, 2009).

### Lack of infrastructural coping capacity

According to JRC's INFORM Risk model, the risk category on the lack of infrastructural coping capacity measures societal abilities to cope with disasters through organized activities, financial and economic systems, and the existing infrastructures (Marin-Ferrer et al., 2017). This risk category looks at the extent to which public structures support communities with disaster response and recovery, thus with strengthening resistance to cope with shocks. It incorporates three main sub-categories: communication networks, physical infrastructures and accessibility to health systems components, which are subsequently subdivided into indicators of access to electricity, adult literacy rate, roads density, access to improved water source and access to improved sanitation facilities. This risk category can thus proxy the economic and infrastructural capacities to cope with shocks.

The absence of economic and infrastructural capacities can lead to increased tensions, especially when combined with other drivers of conflict, as it can translate into limiting people's capabilities to sustain livelihoods, exacerbating poverty, vulnerability and inequality, and thus leading to more grievances and disputes (Liebig et al., 2022). For instance, contexts with more developed infrastructures are more likely to be able to cope with shocks and conditions of insecurity as people can be provided with the necessary resources to endure crises when these occur, whereas administrative areas with poorly developed infrastructures risk facing more struggles to sustain their needs and fall into more disputes and competition for resources (Detges, 2016). Low infrastructural coping capacity can magnify tensions related to resource scarcity as it further impairs abilities to access them. This phenomenon can be illustrated by a study conducted in Indonesia, where rainfall shocks and droughts lead to land-grabbing and create small-scale civil conflicts between rice producers (Gatti, Baylis & Crost 2021). The results of this research showed that districts provided with irrigation structures significantly experienced less conflict since these infrastructures mitigated drops in agricultural productivity and losses, while also preventing resource-related disputes (Gatti, Baylis & Crost 2021). Furthermore, Detges studied why some areas in sub-Saharan Africa experience armed conflict in the occurrence of droughts while other do not and found that access to road and water infrastructures significantly prevents violence (2016). Conversely, low infrastructural coping capacity can also exacerbate tensions related to resource abundance as it can create more disparities in people's capacity to access them, and thereafter leading to more tensions.

The climate-peace mechanisms that result as most relevant for addressing weak infrastructural coping capacities to shocks are **economic development** and **building institutions**. When governing systems cannot provide the adequate economic infrastructures needed to recover from shocks, climate adaptation interventions supporting livelihoods with economic development will facilitate communities to rebound at the household level. In this sense, in contexts where infrastructural capacity lacks, interventions that create livelihoods and sustain existing ones will at least secure income and food production, reducing the potential for conflict and insecurity, whereas the development and restoration of communal spaces and infrastructures will facilitate income-generating activities and diffuse tensions (Dresse et al., 2019). In addition, building institutions will be critical since infrastructural interventions require high-level interventions. Also, building institutions will ensure that such infrastructures are distributed fairly through addressing power imbalances. Other climate-peace mechanisms can be considered as less crucial in

addressing low infrastructural coping capacity to shocks since they are rather geared toward local peacebuilding needs, such as building trust and cooperation, while developing infrastructures requires more administrative-level solutions.

### Lack of institutional coping capacity

INFORM's risk category on the lack of institutional coping capacity measures governmental abilities to cope with disasters through organized institutional systems and it examines the extent to which governments assist communities with disaster preparedness, early warning, and increasing community resilience to shocks (Marin-Ferrer et al., 2017). This category comprises three main components, namely disaster risk reduction, which asserts the extent to which preparedness to shocks is prioritized within the institutions, government effectiveness, which capture the quality of public services and policies, and perceived corruption, evaluating the level of power abuse in state bodies (Marin-Ferrer et al., 2017).

Like the absence of infrastructural coping capacity, the lack of institutional capacity to cope with shocks can be associated with insecurity due to weak governance and administrative systems. Climate and environmental factors are rarely direct causes of conflict, whereas weak institutions are commonly recognized as a conflict and insecurity driver since they can lead to societal instability, particularly when coupled with other risk factors (Forsyth & Schomerus, 2013; Peters et al., 2020; Hagmann & Mulugeta, 2008). For instance, examples of pastoral disputes illustrate how low institutional capacities can lead to conflict in the occurrence of droughts. Hagmann and Mulugeta advocate that resource governance is often under-represented when discussing intergroup conflicts in pastoral systems to make space for environmental factors, such as droughts, and that more attention should be given to these drivers (2008). In Ethiopia, for example, much attention has been brought to drought as the direct cause of intercommunal disputes for pastureland through resource scarcity, whereas weak resource governance ingrained in ethnic federalism only magnified disparities in access to resources and played a significant role in driving competition and conflict between pastoralists from different ethnic groups (Hagmann & Mulugeta, 2008). Thus, governments' ineffectiveness to cope with shocks related to natural resource scarcity can create competition between resource users, inequalities, marginalization, and conditions of insecurity leading to conflicts. Similarly, weak institutional capacities are also of concern for conflict in situations characterized by natural resource abundance (Peters et al., 2020). For instance, a study has shown that in the Horn of Africa there is a positive correlation between abundance of vegetation cover and the rates of conflicts and cattle raid between pastoralists, which was directly related to weak resource governance regarding property rights (Meir, Bond & Bond, 2007). In addition, the absence of governance effectiveness to prevent shocks undermines communal-level resilience against hazards, which can translate into more fragile and conflict-prone systems (Peters et al., 2020).

Several climate-peace mechanisms can be considered as relevant in addressing the conflict drivers related to the absence of institutional coping capacity. **Building institutions** appears as critical for addressing resource-scarcity and abundance related disputes since facilitating legal pluralism and resource rights can mitigate, enhancing institutional capacities for good environmental governance and strengthening government regimes will mitigate conflicts over natural resources (Dresse et al., 2019; Johnson et al., 2021). Additionally, since poor governance effectiveness can lead to societal instability, marginalization and ethnic exclusion, **building trust and cooperation** through climate action interventions can mediate and reduce conflict potentials through creating shared identities, enhancing social cohesion and empowering vulnerable groups (Dresse et al., 2019). Similarly, **enhancing knowledge** could address the social exclusion and marginalization since facilitating environmental education while fostering different

ontologies around environmental resources has been shown to create shared identities and acceptance of 'the other' as a legitimate user of shared landscapes (Huda, 2021). Lastly, since the absence of institutional coping capacities also relates to reduced communal resilience to withstand and prepare for shocks, and therefore to increased fragility and instability, **building capacities and resilience** is a suitable climate-peace mechanism for this risk category.

# 5. The Climate Security Sensitiveness Tool (CSST)

## *Background*

Climate adaptation interventions, such as programs promoting climate-smart agricultural innovations, are proving effective in increasing farmer resilience as well as food and nutrition security (Mizik, 2021; Thornton et al., 2022). However, there is often little understanding of the potential positive and negative externalities that these programs can have, particularly in terms of peace and security. Maladaptation can create and sustain lock-ins, magnify inequity, marginalize people, and places vulnerable to climate-related risks, such as low-income households, people who reside in informal settlements, ethnic minorities, Indigenous Peoples among others (IPCC, 2022). These are commonly recognized drivers of conflict which must be accounted for while designing programs to avoid creating or exacerbating conflicts.

The CGIAR Focus Climate Security has been contributing to addressing maladaptation through the development of a climate security sensitiveness tool (CSST), a programming assessment tool for conflict-sensitive and peace-responsive climate action in agricultural interventions. The CSST is a means for change agents from governmental and non-governmental organizations to support rural communities to adapt to climate change while reducing the potential for conflict of their programs and maximize social cohesion and integration.

The CSST is employed on the premise that any fragile context is characterized by a unique set of risk factors for crises that can lead to insecurity and conflict, including natural hazards, human hazards, socioeconomic vulnerabilities, vulnerable groups, low institutional capacity to cope with shocks, and infrastructural coping capacity. These risk categories are retrieved from the crisis risk model developed by the Joint Research Center of the European Commission, the INFORM Risk model (Marin-Ferrer et al., 2017). Crisis risk models are particularly relevant for characterizing the contextual drivers of conflict and insecurity of different geographies as they assess threats to humans' wellbeing from a systemic approach while considering the complexity of the interlinkages between natural and socio-political vulnerability factors, leading to fragility and in some cases to conflict (Borodzicz, 2005; Simpson et al., 2021; Stein & Walch, 2017).

The tool draws on the growing body of research on environmental peacebuilding, which is the practice of using environmental challenges and resource-based disputes as opportunities to build intra- and inter-communal cooperation, social integration, and peace through the transformation of natural resource management strategies (Krampe, Hegazi & VanDeveer, 2021). It employs frameworks on environmental peacebuilding, developed by Dresse et al. (2019) and Johnson et al. (2021), to express how climate adaptation can contribute to peacebuilding through a Climate-Peace Framework. The framework introduces six climate-peace mechanisms: economic development, building institutions, building trust and cooperation, resource sustainability, enhancing knowledge and building capacity and resilience. Climate-peace mechanisms translate how different characteristics of climate action interventions can address conflict drivers, such as by strengthening livelihoods, improving resource governance, or

addressing inequality or environmental degradation. They can be conceptualized as the means through which conflict drivers can be addressed to attain climate-resilient peace.

Through literature reviews, climate-peace mechanisms have been linked to the crisis risk categories presented above, based on their relevance in addressing them. Risk categories are here referred to as conflict and insecurity drivers. Table 3 summarizes the linkages between mechanisms and drivers stemming from this review and shows which mechanisms are critical to counteract the drivers identified. For instance, the table shows that building institution is a crucial component in addressing all drivers of conflict and insecurity.

***Table 3: Theoretical relationships between climate-peace mechanisms and drivers of conflict and insecurity. Tick marks show which climate-peace mechanisms are critical to tackle each conflict and insecurity driver***

| **DRIVERS OF CONFLICT & INSECURITY** | **CLIMATE-PEACE MECHANISMS** | | | | | |
|---|---|---|---|---|---|---|
| | Economic Development | Building Institutions | Building trust and cooperation | Resource sustainability | Enhancing knowledge | Building capacity and resilience |
| *Lack of infrastructural coping capacity* | ✓ | ✓ | | | | |
| *Lack of institutional coping capacity* | | ✓ | ✓ | | ✓ | ✓ |
| *Human hazards* | ✓ | ✓ | ✓ | | | ✓ |
| *Natural hazards* | ✓ | ✓ | | ✓ | | ✓ |
| *Vulnerable groups* | ✓ | ✓ | ✓ | ✓ | ✓ | |
| *Socioeconomic vulnerabilities* | ✓ | ✓ | ✓ | ✓ | | ✓ |

## *Purpose and target*

The CSST is meant to be adopted at the designing phase of a project. It aims to improve the suitability of agricultural climate adaptation program designs in relation to these pre-existing drivers of conflict and insecurity, and to enable recommendations on how they can be more effectively implemented. It does so by prioritizing climate-peace mechanisms based on the risk levels of contextual drivers. An ideal set of climate-peace mechanisms for a given context is provided which can be compared to the set of mechanisms currently delivered by the proposed program design, allowing practitioners to re-define their intervention plan in order to match the ideal mechanisms.

This tool targets practitioners, decision makers and multilateral institutes interested in diagnostic research for peace responsive climate action in the context of rural development. The CSST is useful for stakeholders investing in and designing an agricultural climate action program with the goal to prevent maladaptation and related unintended consequences, avoid conflict relapses and contribute to peacebuilding.

## *Methodology*

Central to this tool is the idea that context-specific drivers of conflict and insecurity can be addressed by a specific set of climate-peace mechanisms. The CSST results into two main outputs: the projection of an ideal set of climate-peace mechanisms for the selected context, and the set of mechanisms currently delivered by the proposed program design.

## Defining ideal climate-peace mechanism scores for a given context

Locally relevant conflict drivers are identified using an indicator-based approach. Indicators are assessed at the national, regional and local levels according to the set of pre-defined potential conflict drivers listed above, sourced from the Joint Research Centre's INFORM risk index (Marin-Ferrer et al., 2017). Indicators are assessed on a scale from 0 and 10, with risk-level values varying between categories. Table 4 shows the risk threshold classes for each driver.

***Table 4: Classes thresholds in INFORM (Marin Ferrer M., Vernaccini L., & Poljansek K., 2017)***

| Category | CLASS | MAX | MIN |
|---|---|---|---|
| NATURAL | very high | 10.0 | 6.9 |
| | high | 6.8 | 4.7 |
| | medium | 4.6 | 2.8 |
| | low | 2.7 | 1.3 |
| | very low | 1.2 | 0.0 |
| HUMAN | very high | 10.0 | 9.0 |
| | high | 8 | 7 |
| | medium | 6.9 | 3.1 |
| | low | 3.0 | 1.0 |
| | very low | 0.9 | 0.0 |
| SOCIO-ECONOMIC | very high | 10.0 | 7.1 |
| | high | 7.0 | 5.4 |
| | medium | 5.3 | 3.5 |
| | low | 3.4 | 1.8 |
| | very low | 1.7 | 0.0 |
| VULNERABLE GROUPS | very high | 10.0 | 6.3 |
| | high | 6.2 | 4.4 |
| | medium | 4.3 | 2.9 |
| | low | 2.8 | 1.6 |
| | very low | 1.5 | 0.0 |
| INSTITUTIONAL | very high | 10.0 | 7.3 |
| | high | 7.2 | 6.0 |
| | medium | 5.9 | 4.9 |
| | low | 4.8 | 3.3 |
| | very low | 3.2 | 0.0 |
| INFRASTRUCTURE | very high | 10.0 | 7.4 |
| | high | 7.3 | 5.4 |
| | medium | 5.3 | 3.5 |
| | low | 3.4 | 2.1 |
| | very low | 2.0 | 0.0 |

These risk threshold classes enable to provide a weight of severeness of the drivers. Drivers featuring very high risk are assigned a weight of 5, high risk is assigned a weight of 4, medium risk is assigned a weight of 3, low risk is assigned a weight of 2, and very low risk is assigned a weight of 1. Drivers' risk severeness informs on the relevance of the mechanisms they are linked to. Mechanisms' relevance scores are then defined by summing the weights of drivers that each mechanism is crucial for addressing (see table 3 for mechanisms-drivers linkages). For instance, if all drivers feature a very high-risk class (risk weight of 5), the building institutions mechanism will get a relevance score of 30 as it is relevant for all six drivers, while the enhancing knowledge mechanism will get a relevance score of 10 as it is only relevant for two drivers. Conversely if all drivers feature a very low-risk class (risk weight of 1), the building institution mechanism will get a relevance score of 6, while enhancing knowledge will get a relevance score of 2. Thus, maximum and minimum relevance scores vary between mechanisms due to their differences in addressing each driver. In order to visually project mechanisms' relevance as a proportion of importance for a given context these scores are thereafter standardized. For this, relevance scores are divided by the maximum score they can get and expressed as percentages. In this sense, the maximum score a mechanism can get is adopted as denominator. Being 5 the higher driver risk severeness weight, the maximum relevance score for economic development will be a fraction out of 25 since it is crucial for addressing five drivers, the one for building institutions will be a fraction out of 30 since it is critical for addressing all six drivers, the one for building trust and cooperation will be a fraction out of 20 since it links to four drivers, the one for resource sustainability will be a fraction out of 15 since it is critical for three drivers, the one for enhancing knowledge will be a fraction out of 10 since it only addresses two drivers, and the ones for building capacity and resilience will be a fraction out of 20 since it addresses four drivers. These fractions, which are visually represented as percentages, display the ideal scores for each mechanism for the local context identified on a spider chart.

### Defining climate peace mechanism scores delivered by proposed climate action intervention

Through the building of the Climate-Peace Framework, mechanisms were qualified into sub-mechanisms which characterize how climate adaptation efforts can contribute to fulfilling these mechanisms, and therefore contribute to peace (see table 2). A scoring system was developed upon these sub-mechanisms to assess the contribution towards each climate-peace mechanism of a climate action program design. Sub-mechanisms are given a score of either 0, 0.5 or 1, with 0 being the absence of the component in the program design, 1 being its presence, whereas 0.5 is given when the sub-mechanism is somehow or indirectly fulfilled. Sub-mechanism scores are then averaged to inform a score for each climate-peace mechanism. Mechanisms' overall scores are expressed as percentages and plotted on a spider chart.

## *How to use the tool*

The CSST is composed of two main steps: the context definition and the climate action scoring system. Implementing the first component results in the projection of the ideal set of climate-peace mechanisms for the selected context, while the second component provides the set of mechanisms currently delivered by the proposed program design. Visually aligning these two sets enables practitioners to re-define their intervention to match the ideal mechanisms.

The interface of the CSST is an excel file with four sheets, one for the context definition step, one for the climate action scoring system, one for displaying the results and an auxiliary sheet where data is accessed.

### Step 1: Context definition

In the context definition step, users can select the country, the region and the municipality in which the proposed climate adaptation program is planned on being implemented. Due to data availability limitations, only some countries will display data at the regional and municipal levels. The tool then automatically plots the indicators scores for each driver, retrieved from JRC's INFORM Risk databases. The cells containing indicator scores are automatically highlighted, either in red, yellow or green. Cells highlighted in green show drivers featuring very low and low-risk levels, cells highlighted in yellow show drivers featuring medium-risk levels, and cells highlighted in red show drivers featuring high and very high-risk levels. The color-codes provide users with a broad understanding of the worrisome risk factors in the context they plan on implementing their program. Figure 3 shows the interface of the CSST for step 1, with a context definition example for the Colombian municipality of Coveñas, in the region of Sucre.

**Step 1: Context Definition**

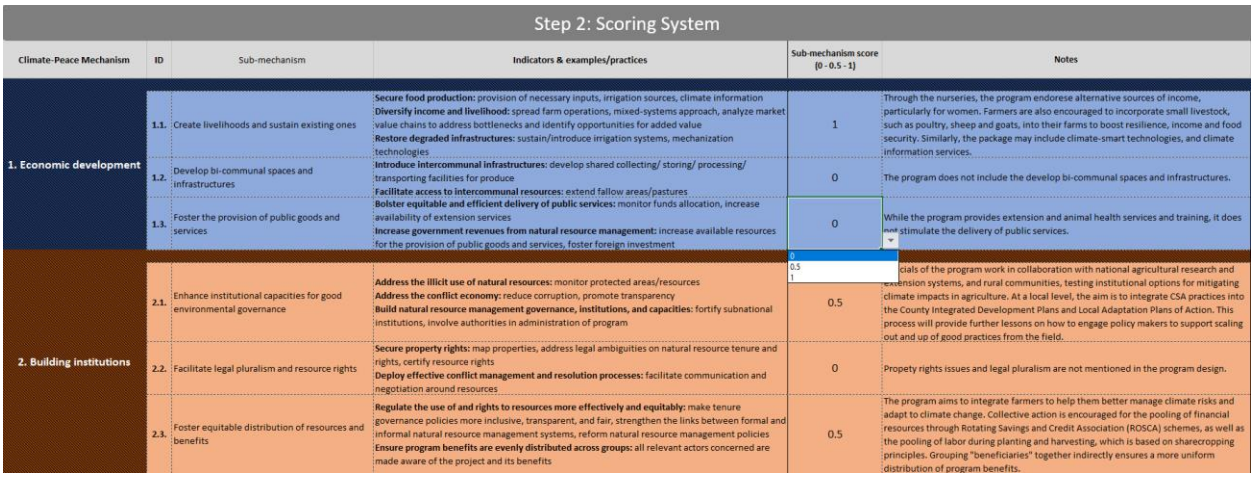
| Country (select country below) | Region (select region below) | Municipality (select municipality below) | Drivers of conflict and insecurity | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Low infrastructural capacities | Low institutional capacities | Human hazards | Natural hazards | Vulnerable groups | Socio-economic vulnerabilities |
| Colombia | Sucre | Coveñas | 6.824068046 | 6.82406805 | 1.810037 | 2.8022894 | 3.2271799 | 4.8489087 |

Caimito
Chalán
Coloso
Corozal
Coveñas
El Roble
Galeras
Guaranda

***Figure 3: Interface of the CSST context definition step (step 1)***

## Step 2: Climate action scoring system

In the climate action scoring system step, the user scores the proposed climate adaptation intervention across the different sub-mechanisms. Examples and proxies are provided for the user to get an understanding of the characteristics a climate adaptation intervention needs to include in order to fulfill those sub-mechanisms. The user can only fill the scores with either a 1, a 0.5 or a 0 in the cells under the column 'Sub-mechanism scores'. A score of 1 can be added when the sub-mechanism is fully fulfilled, a score of 0.5 when the sub-mechanisms is partly or indirectly fulfilled, and a score of 0 when the sub-mechanism is not fulfilled. Thereafter, the user must justify the selection of scores it placed by adding concrete explanations on how the program contributes to addressing the sub-mechanism. This is done for each sub-mechanism's row, under the column 'notes'. Figure 4 shows the interface of the CSST for step 2 with an example of the scoring process for two climate peace mechanisms: economic development and building institutions.



Step 2: Scoring System

| Climate-Peace Mechanism | ID | Sub-mechanism | Indicators & examples/practices | Sub-mechanism score (0 - 0.5 - 1) | Notes |
|---|---|---|---|---|---|
| 1. Economic development | 1.1. | Create livelihoods and sustain existing ones | **Secure food production:** provision of necessary inputs, irrigation sources, climate information<br>**Diversify income and livelihood:** spread farm operations, mixed-systems approach, analyze market value chains to address bottlenecks and identify opportunities for added value<br>**Restore degraded infrastructures:** sustain/introduce irrigation systems, mechanization technologies | 1 | Through the nurseries, the program endorese alternative sources of income, particularly for women. Farmers are also encouraged to incorporate small livestock, such as poultry, sheep and goats, into their farms to boost resilience, income and food security. Similarly, the package may include climate-smart technologies, and climate information services. |
| | 1.2. | Develop bi-communal spaces and infrastructures | **Introduce intercommunal infrastructures:** develop shared collecting/ storing/ processing/ transporting facilities for produce<br>**Facilitate access to intercommunal resources:** extend fallow areas/pastures | 0 | The program does not include the develop bi-communal spaces and infrastructures. |
| | 1.3. | Foster the provision of public goods and services | **Bolster equitable and efficient delivery of public services:** monitor funds allocation, increase availability of extension services<br>**Increase government revenues from natural resource management:** increase available resources for the provision of public goods and services, foster foreign investment | 0 | While the program provides extension and animal health services and training, it does not stimulate the delivery of public services. |
| 2. Building institutions | 2.1. | Enhance institutional capacities for good environmental governance | **Address the illicit use of natural resources:** monitor protected areas/resources<br>**Address the conflict economy:** reduce corruption, promote transparency<br>**Build natural resource management governance, institutions, and capacities:** fortify subnational institutions, involve authorities in administration of program | 0.5 | cials of the program work in collaboration with national agricultural research and extension systems, and rural communities, testing institutional options for mitigating climate impacts in agriculture. At a local level, the aim is to integrate CSA practices into the County Integrated Development Plans and Local Adaptation Plans of Action. This process will provide further lessons on how to engage policy makers to support scaling out and up of good practices from the field. |
| | 2.2. | Facilitate legal pluralism and resource rights | **Secure property rights:** map properties, address legal ambiguities on natural resource tenure and rights, certify resource rights<br>**Deploy effective conflict management and resolution processes:** facilitate communication and negotiation around resources | 0 | Propety rights issues and legal pluralism are not mentioned in the program design. |
| | 2.3. | Foster equitable distribution of resources and benefits | **Regulate the use of and rights to resources more effectively and equitably:** make tenure governance policies more inclusive, transparent, and fair, strengthen the links between formal and informal natural resource management systems, reform natural resource management policies<br>**Ensure program benefits are evenly distributed across groups:** all relevant actors concerned are made aware of the project and its benefits | 0.5 | The program aims to integrate farmers to help them better manage climate risks and adapt to climate change. Collective action is encouraged for the pooling of financial resources through Rotating Savings and Credit Association (ROSCA) schemes, as well as the pooling of labor during planting and harvesting, which is based on sharecropping principles. Grouping "beneficiaries" together indirectly ensures a more uniform distribution of program benefits. |

***Figure 4: Interface of the CSST climate action scoring system step (step 2)***

## Results

The results sheet of the tool's interface provides the user with an overview of the results and a graphic representation of ideal combination of mechanisms scores for the selected region (left spider-chart in figure 5), and the mechanisms scores for the proposed climate action intervention (right spider-chart in figure 5). Based on the resulting ideal mechanisms (a), the user can assess whether the mechanisms scores featuring the proposed climate action program design (b) score high as well. If relevant context-specific mechanisms score low, the user can consider further integrating sub-mechanism features in the proposed program. Figure 5 shows the spider charts resulting from using the tool for a climate adaptation intervention in the context of Coveñas. Based on the ideal set of climate-peace mechanism scores (a) displayed in figure 5, the user can see that the proposed climate adaptation intervention (b) adequately includes features for the climate-peace mechanisms 'enhancing knowledge' and 'building capacity and resilience', sufficiently includes features for the mechanisms 'resource sustainability' and 'building trust and cooperation', and insufficiently addresses the mechanisms 'economic development' and 'building institutions'.

The data for the two charts results from different methodologies, since ideal mechanisms scores are defined through combining weights and risk score indicators while the ones for the proposed intervention come from the user filling the scoring systems. Therefore, the two spider charts are not numerically

comparable, and the comparison between the two graphs should be made with caution. The left chart informs on the extent to which each mechanism is relevant for the selected context, whereas the right chart informs on the extent to which each mechanism is incorporated by the proposed intervention. The comparison between the two graphs should then be approximate.


***Figure 5: Interface of the CSST results: spider chart of the ideal climate-peace mechanisms scores for the selected context (left) and spider chart of the climate-peace mechanism scores for the proposed intervention (right)***

The results provided by the tool can be useful to formulate recommendations on how climate adaptation programs can address contextual drivers of conflict and insecurity more effectively. When the user has identified the relevant mechanisms for addressing contextual drivers that are underrepresented in the proposed program, improvements can be made to the design by further incorporating sub-mechanisms that led to a low score for those relevant mechanisms. Figure 6 shows the intervention's sub-mechanisms scores. In this case, by having identified economic development and building institutions as relevant mechanisms that the proposed design did not sufficiently integrate, the user can then incorporate more sub-mechanisms pertaining those mechanisms (figure 6). For example, the user can improve the program design by integrating features to facilitate the development of bi-communal spaces and infrastructures, foster the provision of public good and services, and facilitate legal pluralism and resource rights.

| STEP 2: SCORING SYSTEM | | | |
|---|---|---|---|
| Mechanisms | Sub-mechanisms | Score | |
| Economic development | 1.1. Create livelihoods and sustain existing ones | 1 | 0.33 |
| | 1.2. Develop bi-communal spaces and infrastructures | 0 | |
| | 1.3. Foster the provision of public goods and services | 0 | |
| Building institutions | 2.1. Enhance institutional capacities for good environmental governance | 0.5 | 0.33 |
| | 2.2. Facilitate legal pluralism and resource rights | 0 | |
| | 2.3. Foster equitable distribution of resources and benefits | 0.5 | |
| Building trust and cooperation | 3.1. Involve both high and grass-root levels while minimizing transboundary contacts | 1 | 0.67 |
| | 3.2. Foster intercommunal trust and create shared identities | 0 | |
| | 3.3. Enhance social cohesion and empower vulnerable groups | 1 | |
| Resource sustainability | 4.1. Restore degraded ecosystems | 0.5 | 0.5 |
| | 4.2. Foster adoption of practices for sustainable use of resources | 1 | |
| | 4.3. Conserve ecosystems and common-pool resources | 0 | |
| Enhancing knowledge | 5.1. Raise public awareness and increase learning opportunities | 1 | 1 |
| | 5.2. Establish the recognition of diverse ontologies in climate adaptation through grassroots approaches | 1 | |
| Building capacity and resilience | 6.1. Increase livelihood climate coping capacity | 0.5 | 0.75 |
| | 6.2. Increase livelihood climate adaptation capacity | 0.75 | |
| | 6.3. Increase livelihood climate transformative capacity | 1 | |

***Figure 6: Interface of the CSST results: sub-mechanism scores useful to formulate recommendations to better address contextual drivers of conflict and insecurity***

# 6. Conclusions and limitations

This paper attempted to lay the theoretical groundwork for linking climate action and peacebuilding, and gather useful evidence to inform programming, investments and policy to achieve the double dividend of climate adaptation and peace. This was done by building the Climate-Peace Framework, a framework for connecting climate adaptation elements to peace-contributing outcomes in order to attain climate-resilient peace. A conflict-sensitive and peace-responsive programming tool was conceptualized through linking the climate-peace mechanisms arising from this framework with existing crisis risk indicators, retrieved from the INFORM Risk model: the Climate Security Sensitiveness Tool. This tool improves the suitability of agricultural climate adaptation program designs in relation to pre-existing drivers of conflict and insecurity and enables recommendations on how they can be more effectively implemented. By doing so, it strives to prevent maladaptation and related unintended consequences, avoid conflict relapses and contribute to peacebuilding. However, this programming tool embodies limitations.

Although crisis risk models can be considered as suitable for characterizing contextual drivers of conflict and insecurity, the use of JRC's INFORM Risk indicators does not fully capture the complexity of climate and security interconnections. For instance, climate-related security issues can arise from slow onset climate impacts, which are not directly integrated within this model. In fact, JRC's indicators capturing climatic risks only feature sudden onset natural hazards as they only take into consideration floods, droughts, cyclones and earthquakes. Therefore, it is difficult for the CSST to capture these indirect linkages. In addition, INFORM Risk indicators often lack granularity since data at the regional and municipal level is not available for all countries. Risk factors and their severity can greatly vary from a municipality to another although being part of the same region. This data-base falls short on capturing localized granular data. To address this limitation, data collection activities on the ground are necessary for validating these indicators.

The CPF incorporates conflict-sensitive foundations as different aspects of climate adaptation programming were systematized to minimize conflict relapses in deeply divided societies, thus minimizing negative impacts, while other ones were systematized to maximize shared identities, social cohesion and substantial integration, thus maximizing positive impacts. However, the way that the tool was developed is more useful for peace-responsiveness since its design is based on prioritizing climate peace-mechanisms in order to address contextual drivers of conflict. Therefore, even though the framework underlying the tool strives for conflict-sensitivity, the CSST hardly provides conflict-sensitive recommendations, but rather peace-responsiveness ones. To become more conflict-sensitive, the tool should further explore addressing the 'initial conditions' characteristics presented by the CPF.

Lastly, a limitation of the tool is that it does not include the perspectives of beneficiaries regarding their perceived needs in terms of climate action interventions. The tool is useful for practitioners, investors and multilateral institutes that need to prioritize climate adaptation features to avoid maladaptation when planning climate adaptation programs. However, the tool provides these users with recommendations based on indicators that quantitatively categorize conflict and insecurity risks. The CSST therefore needs further improvements in order to also include the needs of the beneficiary communities based on qualitatively assessing their needs and perceived climate and insecurity risks.

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