The Humanitarian Sector Needs Clear Job Profiles for Climate Science Translators Now More than Ever
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ABSTRACT: A new generation of climate science translators (CSTs) is currently evolving, both as independent professionals and affiliated with humanitarian agencies. While people in this role represent an opportunity to foster communication and collaboration between climate science, humanitarian decision-support, policy, and decision-making, there are neither clear job profiles nor established criteria for success. Based on an analysis of job opportunities published on one of the largest humanitarian and development aid job portals, we show that the demand for CSTs has been increasing since 2011. Subsequently, we present a characterization of core skills for the next generation of CSTs aiming to establish a space for not only current CSTs to thrive, but also a path for future translators to follow, with milestones and opportunities for recognition.

KEYWORDS: Climate variability; Climate services; Decision support; Emergency preparedness; Emergency response; Risk assessment
The impact of extreme climate events will continue to disproportionately affect low-income countries, with impacts increasing in frequency and in geographical extent (Field et al. 2012; Panwar and Sen 2019). While disaster risk reduction strategies are evolving, in line with the Sendai Framework for Disaster Risk Reduction, to include more comprehensive and sophisticated programs in anticipatory action (Aitsi-Selmi et al. 2015; Zia and Wagner 2015), there has not been an appropriately scaled advancement in the definition of specialized careers. The ability to bridge the gap between scientific data and actionable knowledge, as well as to convene transdisciplinary discussions related to risk perception and data-informed decision-making, is growing both in terms of a specialized activity and as a key element of a career as a climate science translator (CST). In addition, the important role of a translator has been highlighted in recent months given the challenges related to anticipating impacts due to extreme climate events compounded with COVID-19 (Phillips et al. 2020). Translators have been and continue to broker discussions both across academic domains, between scientists and practitioners in the field, developing strategies for anticipating potential future impacts related to compound risks (Kruczkiewicz et al. 2021).

However, with the exception of a small sample of the world’s largest aid organizations, such as the International Federation of Red Cross Red Crescent Societies, which has its own climate center (Red Cross Red Crescent Climate Centre) to integrate climate data into their programming (Braman et al. 2010; Jones et al. 2015), many users of climate data tasked to make decisions on behalf of humanitarian or development organizations do not have the necessary skills to understand opportunities and constraints presented by available climate data (Coughlan de Perez and Mason 2014). Additionally, these “end-users” are many times tasked to make decisions in complex settings under extreme stress, further limiting the opportunity for a proper or sufficient vetting of data (Carr et al. 2020; Stephens et al. 2015). In the area of climate risk financing, for instance, CSTs have been effective in bridging the gap between climate change projections and direct impacts on physical assets, with at least one outcome being a clearer framing of the differences between global climate models and weather forecasts (Fiedler et al. 2021; Pasgaard 2015). Similarly, it is the role of “boundary spanners” to cultivate a more dynamic relationship between environmental science and policy-making (Bednarek et al. 2018, 2016; Goodrich et al. 2020; Nauman et al. 2021). While climate adaptation initiatives are receiving significant levels of funding, US$200 billion from the World Bank alone between 2021 and 2025 (World Bank 2018), the potential of many climate-focused decision-support tools remains largely untapped. This can lead to uncertainties in decision-making with far-reaching consequences, such as a misuse or misinterpretation of climate information, that result in harmful short-term consequences or worse, promoting longer-term maladaptation (Dilling and Lemos 2011; Jagannathan 2019; Nissan et al. 2019).

The age of climate science translators
A new generation of CSTs that specialize in the brokering, translation, and tailoring of climate science data to decision-makers (and/or “data” from humanitarian decision-making

processes and actions to climate/data scientists) is currently evolving, both independently and affiliated with humanitarian aid organizations, as well as within the tech sector, to cope with the growing urgency and complexity of climate-related issues. CSTs have the skills to foster the communication, translation, and trust-building between climate research that is often characterized by in-depth analysis of data, methods, and physical phenomena, and the community of practitioners, whose jobs can be characterized by horizontal complexity (Balcik et al. 2010). By understanding the critical elements of technical capacities, standard operating procedures, and operational constraints, CSTs can fill critical gaps in both applied research and decision-support. They can break down the silo mentality which is detrimental to both science and applications. However, just like in interdisciplinary sustainability science, career benchmarks for CSTs are still unclear, leading to a career environment that fails to promote growth (Hernandez-Aguilera et al. 2021).

Redefining impact factors
In contrast to traditional climate scientists, the “impact factors” of CSTs are not solely reflected by original research articles, but rather by a combination of application and adaptation of existing research findings for real-life activities that often link climate science to behavioral sciences, socioeconomic, health assessments, or humanitarian and development activities. Far too often, a CST is perceived to lack full commitment and/or expertise related to one role (climate science) or the other (practical use of climate science information), which leads to the interpretation of a CST to be partial and/or peripheral members of each role (Safford et al. 2017). With the identification of the importance of a CST, but without the acknowledgment of a CST being an expert operating in the complex space between the two, the demand will likely continue to grow, potentially attracting candidates that are not seeking a long-term career in that space—primarily because it does not exist.

This perception not only presents challenges in attracting and retaining strong candidates, but can also lead to subsequent complexities in the broader climate services community related to scaling and iteration, for which CSTs are acknowledged as a critical element of successful and sustainable activities (Webber and Donner 2017; Vaughan et al. 2016). However, even after being identified as a role that is necessary for successful research-driven decision-support, the CST career path remains loosely defined.

Practical implications
While a rigid definition for CSTs may present challenges for attracting and retaining candidates, some guidelines and key principles are likely beneficial. Further, a “transdisciplinary” structure of a CST career path could have a knock-on benefit of promoting interest across the climate services community (Basche et al. 2014; Harris and Lyon 2014). With a career path description that captures the variety of CST activities and responsibilities could lead to more “climate interested” candidates prioritizing a CST career over other career choices, driving an increase in sustainable climate services (Ernst et al. 2019; Patterson et al. 2013).

Convening a team of experts with a background in highly specialized fields of climate research can be the ideal approach in certain scenarios, such as situations with high potential loss of life and livelihood. However, doing so is costly in terms of resources and time, and not feasible in all cases due to the large number of disasters (Fisher and Kingma 2001; Zhou et al. 2018). CSTs may be called upon to advise in situations involving a variety of hazards, datasets, and decisions. To better understand interactions with various compounded hazards and social contexts, it would be best to describe the skills involved with identifying and managing the geophysical variables related to disaster risk management. In doing so, not only can the CST be evaluated for providing sufficient (or exemplary) service, but there is also an opportunity to
discuss and applaud moments within service provision whereby a CST was able to understand their constraints in integrating data and/or responsibly understanding their own limitations and subsequently facilitating discourse with additional subject matter experts.

The responsible use of seasonal and subseasonal climate forecast models, for instance, does not require an in-depth understanding of every model component, but it does require a certain level of competency as well as the skill to interpret and communicate their characteristics, opportunities, and limitations (Goddard et al. 2010; Lemos et al. 2002). While the data processing step of applied climate science may include multimodel ensemble predictions, and thus capturing an appropriate representation of uncertainty, decisions on the ground are mostly binary. In the humanitarian sector, decision-makers are asking specific questions to decide if actions should be taken. In many cases, an action must be taken, even if the available climate information is imperfect (Eiser et al. 2012), because the cost of doing nothing can be significant. Examples for these specific questions are as follows: Do we restock food supplies or rely on existing ones? Shall we publish an early warning? Is an evacuation necessary? If yes, what areas are prioritized and what data are we using to justify this prioritization?

CSTs strengthen narratives with various kinds of qualitative and quantitative data. In many cases, their skill to create a space for convening dialogues or facilitating narratives involving the interpretation of complex climate data helps to guide practical humanitarian decisions. An operational and mutually beneficial relationship of CSTs with scientists and potential users can increase the likelihood of science-based decision-making with a greater appreciation and understanding of the science being used, but only if we manage to agree on a core set of required skills, a list of sector-specific proficiencies, and design job profile.

**From climate science into actionable knowledge**

It seems as if employers in the humanitarian and development sector have already begun to realize that the strategic, continuous, and proactive integration of climate information within decision-making workflows means an operational added-value. To preliminarily assess if and to what degree the acknowledgment for such activities is becoming more in demand, a process was developed to query a dataset of job postings in the humanitarian and development community.

The Advanced Programming Interface (API), one of the largest humanitarian job portals ([www.reliefweb.jobs](http://www.reliefweb.jobs)), which listed 7,495 vacancies in the “climate change and environment” category between 2011 and 2020, was queried using Reliefweb’s online API interface ([https://apidoc.rwlabs.org/](https://apidoc.rwlabs.org/); see online supplemental material). Next, a keyword-based search was performed focusing on the “body” portion of each job post, identifying occurrences of CST-specific keywords (translate/translator/translating, facilitate/facilitator/facilitating, communicate, communicator/communicating, decision-maker/decisionmaker, decision/decision-making/decisionmaking, coproduce/coproducing/coproduction, tailor, broker, intermediate, intermediary, interdisciplinary, community/stakeholder engagement). For every year, 2% of all job posts were randomly selected, representing vacancies based on every continent but Oceania. Every job posting was manually quality checked based on five different rankings, representing varying degrees of matching with the CST profile described in this essay:

1) No match.
2) Partial match: Requires some environmental/climate knowledge and understanding of modus operandi, but no practical/operational links to humanitarian decision-making workflows.
3) Strong match: Requires knowledge of strengths and limitations of climate data and services from various sources; links to operational activities exist, but are not clearly defined.
4) Very strong match: Strong analytical climate, environmental and/or data skills required, good understanding of modus operandi with respect to environmental/climate data versus humanitarian and/or development activities, but operational role not 100% clear.

5) Best match: Meets most of the skills and criteria listed in the manuscript (including broker role, deeply rooted in both networks, understanding of cost/benefits, ethical codes, etc.).

While only 3% of job posts in the sample were classified as “no match,” 14% were classified as “partial match,” 32% as “strong match,” 39% as “very strong match,” and 12% as “best match.” Examples from the latter category include job postings from governmental and nongovernmental development and aid organizations, such as CARE International, Plan International, Chemonics, or the United Nations Development Programme (UNDP).

An analysis of all annual JavaScript Object Notation (JSON) files in the “climate change and environment” job category suggests an overall increase in both absolute and relative terms. While only 30% (74) of the jobs listed in the category contained any of our keywords in 2011, the number increased to 51% (599) in 2020 (Fig. 1).

**Necessary skills for current and future CSTs**

Having worked with different aid and development organizations, we believe that the following skills, among others, should become part of future job profiles for CSTs. Wherever possible, suggestions are backed by scientific references that either explicitly or implicitly discuss the respective skills:

- Knowledge of strengths and limitations of Multi Hazard Early Warning Systems (MHEWS) (World Meteorological Organization 2018), climate data, and services from various sources (included, but not limited to, in situ, satellite-derived, modeled, and assimilated data).
- Understanding the modus operandi, standard operating procedures, and requirements of the respective humanitarian and development end user.

![Jobs in Climate Change & Environment vs. Climate Science Translators (CST) vs. relative Share of CSTs (Source: Reliefweb Jobs)](chart)

Fig. 1. Time series from 2011 to 2020 of 1) total jobs postings in the category “climate change and environment” (blue), 2) job postings (in the category climate change and environment) classified as CST (red), and 3) relative share of CST (yellow).
• Understanding mechanisms to integrate new sources of information and methods (Van den Homberg et al. 2020) into existing humanitarian and development workflows that are gradually shifting toward anticipatory action.

• Having the ability to describe and characterize potential links between climate impacts, livelihood changes, and political conflict, including direct and indirect relationships between isolated extreme climate events (or consecutive events of equal or less severe intensities) and socioeconomic impacts; understanding the droughts in Syria that led to displacement, which contributed to the political crisis (Kelley et al. 2015) that is still ongoing is a good example.

• Brokering the themes and related concepts of “data responsibility” (UN Office for the Coordination of Humanitarian Affairs 2019)—to ensure that both are understood and accounted for in a way to acknowledge and dampen/mitigate implicit biases; if, for instance, the training data for methods such as natural language processing (NLP) are constructed based on easily accessible but unrepresentative data, the results cannot only repeat, but amplify social inequities (Kreutzer et al. 2020).

• Having the capacity to understand concepts of uncertainty, accuracy, and skill related to climate and weather forecasts, to both explain when there are opportunities to take advantage of periods of increased forecast skill—such as is the case with seasonal forecasts during El Niño and La Niña (Goddard and Dilley 2005), and when limitations arise.

• Identifying relevant networks across the applied climate science and humanitarian and development community, and convening interactions to adapt and iterate existing solutions where possible or develop new ones where necessary.

• Increasing the awareness of when and how to broker trust, and ways in which the pathway to trust is asymmetric. Based on the example of managing trust at the climate science–policy interface, Lacey et al. (2018) state that trust between two parties can be regarded not only as asymmetric, but bounded to a certain area of expertise. Applied to the concept of CSTs, this could mean that individuals might be trusted to design the triggers for an anticipatory action system for flood risk, but not to coordinate the action on the ground. These boundaries need to be discussed openly and transparently, considering factors related to cross-cultural interactions (Rubinstein 2003) and power imbalance (Sphere 2018).

• Understanding the cost and benefits (Puett 2019), especially related to time and funding, in bringing in additional subject matter experts, and having a sense of when to justify not doing so. This is related to having a sense of when and how to communicate constraints in a CST’s skillset relative to a particular scenario where their services are requested.

• Having the ability to identify misinformation or disinformation, such as fake news, and communicate to decision-makers why various climate data are and are not categorized as such (Valenzuela et al. 2019; Hunt et al. 2020). This should be extended to include maps and tools that may appear to be designed by experts, but in reality are designed by people without climate knowledge nor translator skills, or even by bots (Walshe and Healy 2020).

• With increasing funds available to address climate change, private sector interest is increasing. Therefore, CSTs should have an understanding of the incentive structures, profit models, and ethical codes that the different types of private companies employ (Dutton 2002). And in doing so, CSTs can play a critical role in shaping what mutual benefit means for climate service related public and private partnerships (Larosa and Mysiak 2020; Hewitt et al. 2020).

**Learning from related disciplines**

The humanitarian and development community has the potential to avoid certain challenges within the climate change community, such as those present with integration
of Intergovernmental Panel on Climate Change (IPCC) outputs into practical applications (Viner and Howarth 2014) or the development of guidelines for good practices for climate response strategies (Howarth and Monasterolo 2017). The need for CSTs in the humanitarian and development universe will increase along with the costs felt from climate-related humanitarian and development activities, which could reach up to US$20 billion per year in 2030 (IFRC 2019). The sooner the next generation of CSTs have a clear career path and quantifiable impact factors, the more people will benefit from the translation of data into actionable information to guide decision-making on the ground and subsequently, chances will increase for the humanitarian and development community to integrate current and future climate research findings into their decision-support systems and policy development processes. At this critical stage, it is the responsibility for all involved, from use of the data in community-level decision-making, to algorithm development to produce data; it is up to end users to define which critical gaps CSTs will have to address and how their success will be evaluated. It is up to the climate policy community to incentivize open discussions, with the appropriate, diverse set of stakeholders at the table, about new career profiles for not only current CSTs to exist and thrive, but also outline paths for future translators to follow. And it is up to the donors of climate research projects to reflect real-world needs in their funding strategy (Overland and Sovacool 2020), as well as to monitor and evaluate current programs to ensure that the value of CSTs is accounted for.

**Climate science translators versus the new normal**

Defining the role of CSTs in the “new normal” as a community could be an important first step. Many of the educational and training models to improve integration of research findings within the toolboxes of practitioners already exist, including from academic and humanitarian organization perspectives. Related to the former, various academic programs, such as the Northern Arizona University Climate Science and Solutions program, the Climate and Society Program at Columbia University, or the Climate Change and Society program at North Carolina State University, have been designed to provide space for a multidisciplinary graduate-level experience for facilitating connections between climate science and decision-making (Mantilla et al. 2014; Goddard et al. 2014). Additionally, the Famine Early Warning Systems Network’s (FEWS NET) training and certification for integrated food security phase classification (IPC) and the National Oceanic and Atmospheric Administration’s (NOAA) Regional Integrated Sciences and Assessments (RISA) program are just two examples (Stevenson et al. 2016). Nevertheless, questions remain outstanding regarding prioritization, governance, and accountability, and CSTs can be a key factor in convening discussions within and across disciplines before, during, and after compound disasters (Manzanedo and Manning 2020; Janssen and van der Voort 2020). Questions such as the following should be explored, ideally with a CST as facilitator: How can we pivot from the perception of translating science as less “noble” than the work on traditional research publications to a critical role that might help to maximize the added-value of scientific findings in the real world? Which mechanisms are needed to support practical decision-making under uncertainty, in the face of unclear “critical” thresholds or contradicting information? What is our responsibility to learn from the evolving roles for scientists within COVID-19?

To elaborate further on the parallels that exist with the COVID-19 response, on a global scale, Dr. Anthony Fauci and others had to take on similar roles. They were tasked to broker multifaceted discussions across sectors (and the general public), each with various expertise (and lack of) in relevant aspects of the pandemic, many times while facing tense situations due to the introduction of disinformation (Krause et al. 2020). For example, the tensions between the degree to which uncertainty should be communicated and the level of trust that may be, albeit potentially temporarily, gained by omitting statements
of uncertainty, is something that we can further analyze related to COVID (Kreps and Kriner 2020), and develop case studies to be applied in translating climate and disaster risk information to the general public.

**The future of CSTs**
A change in CSTs could drive significant improvements to the risk management of the world’s most vulnerable communities by facilitating discussion on risk ownership and transfer, as well as promoting technical capacities to adapt research-based decision-support tools to future climate hazards. CSTs alone will not make climate science findings more accessible or useful for the community of practitioners. However, they will be an important ingredient for working across disciplines, allowing researchers to better understand practical needs and workflows while allowing practitioners to make better use of existing knowledge and formulate their needs closer to the scientific state-of-the-art.

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