Indigenous Inclusion in Water Resource Governance and Legislation of the Upper Colorado River Basin

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Keywords: Water policy; Water rights; Indigenous governance; drought management

Executive Summary: Indigenous tribes and governments within the Upper Colorado River Basin have been left to battle failing infrastructure, underrepresentation, outdated legislation, inadequate water allocations, and ongoing disenfranchisement that has limited equitable access to water. On a wider scale, the current state of Western legislation is not inclusive of Indigenous parties. These factors are compounded by a 23-year long drought in the western United States that has placed drought management and climate change at the forefront of critical need for policy makers and state governments. This article highlights some of the current challenges relevant to inclusive Indigenous governance, with the specific context of drought and water resource management. The authors offer recommendations to the Bureau of Reclamation and state governments of the Upper CRB for more encompassing policy practices in Western water law that provide for a just inclusion of Indigenous knowledge and tribal sovereignty within the larger discourse of basin-wide droughts and water scarcity.

I. Introduction

New approaches to legal reform for Upper Basin state governments and the Bureau of Reclamation are necessary to facilitate a transformation of Western law to include and center Indigenous voices in the Colorado River Basin (CRB). This paper aims to frame an informed and intersectional approach to law through a historical, discursive, and scientific analysis of the Upper CRB. The persistence of drought, water scarcity, and exclusion of tribes in the Upper Basin proves the urgency and necessity for change. The Karuk Tribe in the Klamath River Basin provides an exemplary model for Indigenous collaborative governance in the context of water resource management, which can inform new policies in the CRB. Recommendations strive for the inclusivity of Indigenous peoples, collaborative governance, and the pairing of Western science-based and traditional Indigenous practices. Within the scope of this paper, we must acknowledge that we are not Indigenous people. Our identity does not serve us to have authority on Indigenous issues and the specifics of such laws. Rather, our academic integrity and commitment to sustainable legislation allow for a critical analysis that may better inform inclusive law. Legal reform is necessary to support and reframe the oppressive forces that inhibit Indigenous people's integral role in CRB water management. With basin-wide drought agreements set to expire in 2026, these recommendations provide an opportunity for state and federal administrators to reframe contracts in a way that centers Indigenous knowledge in the management of water resources.

II. Colorado River Basin overview

i. Establishment of the Law of the River

The Colorado River acts as a lifeblood for 40 million people and 30 federally recognized tribes that rely on the water system for drinking, sanitation, farming, recreation, and cultural practice. Figure 1 below provides a geographic overview of the CRB as it stems from the Rocky Mountains and traverses

1,400 miles down to the Gulf of Mexico, spanning seven states in the United States and two states in northern Mexico (Department of Interior 2012, 5). Beginning in the early 20th century, Upper Basin states raised concerns over inequitable water allocation amongst rapid growth in the Lower Basin, specifically in the role that unmanaged consumption would play under the Western water rights doctrine of prior appropriation ("Bureau of Reclamation: Lower Colorado Region - Law of the River" 2008). This principle grants a user's claim first priority based on the starting use date, following the concept of "first in time, first in right" (Hockaday and Ormerod 2020). To manage access to surface and groundwater across states regardless of development rates, administrators and land owners across Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming signed the 1922 Colorado River Compact into law, otherwise known as the "Law of the River".

Figure 1: Map of the Colorado River Basin (Colorado River Resources Group 2016).

Under this agreement, California, Arizona, and Nevada were designated as Lower Basin states, while Wyoming, Colorado, Utah, and New Mexico were designated as Upper Basin states. Each basin was designated 7.5 million acre-feet of water per year based on 1922 hydrologic data (Hockaday and Ormerod 2020). However, the Bureau of Reclamation established these water rights during an unusually wet season of high flow rates, which is not representative of long-term arid conditions in the region (NOAA NCEI, n.d.). This resulted in a legally-binding agreement that set the region up for chronic challenges in drought and water scarcity. Additionally, Indigenous tribes were omitted from any formal decision-making at the time of the compact's establishment. The sole mention of Indigenous water rights is denoted in Article VII, which states, "Nothing in this compact shall be construed as affecting the obligations of the United States of America to Indian Tribes" (Gelt 1997). Today, Upper Basin tribes consist of the Jicarilla Apache, Navajo, Southern Ute, Ute Mountain Ute, and the Ute Indian tribe of the Uintah and Ouray Reservation.

ii. Water rights legislation, conflict, and drought

In 1948, the Upper Basin states signed the Upper Colorado River Basin Compact establishing the Upper Colorado River Commission. This legislation assigned 51.75% of the initial 7.5 million acre-feet to Colorado, 23% to Utah, 14% to Wyoming, and 11.25% to New Mexico. Tribes were not consulted in this establishment and presently do not have a seat at the basin-wide commission (Mullane 2024). With the initial omission of tribal rights, the 1908 U.S. Supreme Court case Winters v. The United States remained the only legal statute to enforce tribal water rights for 55 years. In this case, the court broadly determined that tribes have reserved water rights at the formation of the reservation as part of their permanent homeland. In1963, Arizona v. California defined calculable allocations of water for tribes. It only delineated quantities for Lower Basin tribes,however. While tribes' rights are typically considered senior to state law-based rights ("The Winters Doctrine: The Foundation of Tribal Water Rights | Inter Tribal Council of Arizona," n.d.), to this day, Upper Basin tribes are still fighting to acquire quantifiable access to their water rights (Kulikowski 2023). This battle is now heightened by a decades-long hydrological drought plaguing the region.

Within the context of legal tribal engagement in water resource management systems, the hydrological drought is of critical discussion across the basin. Drought levels are measured by a prolonged deficit of precipitation that has caused below average water supply levels in streamflows and subsurface water. NOAA's National Climate Data Center recently reported that droughts in the Upper CRB have become more widespread, severe, and persistent over the last 50–90 years, with temperatures expected to increase by 5–6ºF over the 21st century (NOAA NCEI, n.d.). Downstream from the Rocky Mountains, warmer conditions will result in runoff reductions across the spring and summer. This will result in a reduced water supply for all seven basin states that use the river for hydropower, storage and water supply, recreation, fish and wildlife habitat, and other cultural uses (U.S. Department of Interior, Reclamation 2016, 1).

In the Upper Basin, agriculture accounts for 58% of water consumption, which has historically led to trans-basin diversions and flow declines across tributaries that are essential for funneling water into Lake Powell, the basin's main facility for water storage, supply, and power generation. In 2019, the Upper and Lower Basin Drought Contingency Plans were developed to combat these ongoing challenges. These plans are designed to specifically bolster Lake Powell's storage to "fulfill compact flow obligations and to maintain hydropower generation and revenues at the Glen Canyon Dam" (Water & Tribes Initiative 2019). Researchers suggest it will "take four to five additional unusually wet years… to refill Lake Powell" if current water use goes unchanged (Schmidt, Yackulic, and Kuhn 2023, 1). While the tribal leaders were engaged throughout the initial development of the Drought Contingency Plans, they were not consulted in further water cuts imposed by the Bureau of Reclamation, demonstrating one of many instances in which Indigenous governments have been removed from decision making processes (Vanderpool 2022).

State	**Reservation/Tribe**	**Settlement Agreement**	**Size of the Rights (af/yr)**	
			Diversions	**Depletions**
New Mexico	Jicarilla Apache	Jicarilla Apache Tribe Water Rights Settlement Act of 1992	45,683	34,195
New Mexico	Navajo	Northwestern New Mexico Rural Water Project Act (2009)	606,660	325,670
Colorado	Southern Ute	Colorado Ute Indian Water Rights Settlement Act of 1988	137,090	74,318
Colorado	Ute Mountain Ute	Colorado Ute Indian Water Rights Settlement Act of 1988	88,358	51,081
Utah	Ute Indian Tribe of the Uintah and Ouray Reservation	Revised Ute Indian Compact of 1990 (not ratified)	480,594	258,943
Totals			**1,358,385**	**744,207**

Table 1: Water rights allocations (in acre-foot per year) defined by listed settlement agreements for Upper CRB Tribes (Colorado River Resources Group 2016).

Ultimately, a better understanding of present climatic conditions and drought planning practices frames the current discussion of Indigenous inclusion and shapes our recommendations for improved drought planning policy.

To measure tribes' access to water diversions, Figure 2 displays settlement agreements for Upper Basin tribes, with the Ute Indian tribe of the Uintah and Ouray Reservation in Utah still working to obtain an outstanding ratification. The figure presents estimates of tribes' legal entitlements to use as compared to actual depletion rates (Colorado River Resources Group 2016).

Tribes across the CRB are frequently underutilizing their water rights. Colorado River Research Group estimates that roughly 55% of the 1.36 million acre-feet legally allocated to tribes in the Upper CRB is currently being used (Table 1). This is commonly attributed to historical disinvestment by federal and state entities, resulting in insufficient sanitation and irrigation infrastructure, a lack of Indigenous scientific knowledge in legislation, and an exclusion of tribal consultation in drought plans (Colorado River Research Group 2019, 2). Tribes often compete for water access with neighboring industries, agricultural sectors, and city users. Outdated regulations further restrict tribes from leasing or selling water to neighboring cities (James 2020). Resultantly, CRB tribes have been left to battle failing infrastructure, underrepresentation, outdated legislation, inadequate water allocations, and ongoing disenfranchisement that has limited equitable access to water. This problem is only being heightened as total water supply in the basin dwindles from drought. Coalitions such as the Water & Tribes Initiative are working to address these challenges and enstate long-term objectives to:

1. Enhance tribal capacity to advance their needs and interests on water management.
2. Advance sustainable water management through collaborative decision-making.
3. Integrate traditional Indigenous knowledge with Western science to better represent alternative management scenarios (Water & Tribes Initiative 2019, 5).

Not only is tribal recognition and participatory decision-making critical for ensuring just access to water as a resource in the context of drought, it is also essential in instilling tribal sovereignty under U.S. law.

Eurocentrism	Attributes authority to Western knowledge and culture while disregarding and disparaging other (Munshi 2017, 226)
Systemic Racism	Deeply rooted racism in systems of discourse. Systems of power perpetuate racial hierarchy and white supremacy (Tuffin and Frewin 2008, 70); Acknowledges historical oppression of non-European groups–including the genocidal killing of Indigenous people and theft of their land–as a deep part of the social structure rather than a matter of racial prejudice (Feagin 2006, 2)
Colonialism	Conquest of people and their territories to impose foreign (typically eurocentric values onto non-eurocentric communities) institutions, values, and worldviews (Guzmán 2019, 64)
Anthropocentrism	Belief that centers human beings above all else and perceives aspects of our environment to be in service to humans (Kopina et al. 2018, 1); Indigenous culture does not share the anthropocentric relationship between humans and nature (Guzmán 2019, 78)

Table 2: Key discursive concepts and definitions.

III. Discursive concepts to frame law in the CRB

Policy Problem: The current state of Western legislation is not inclusive of Indigenous people but is due for change in 2026. Due to consistent historical exclusion, Western law systemically silences Indigenous people (Guzmán 2019, 61). Understanding the discursive concepts defined in Table 2 is one step closer to understanding the full picture of the water management issues at hand: Indigenous tribes in the CRB are negatively impacted by the biases perpetuated through Western law.In application to legal reform, these concepts inform lawmakers in Upper Basin state governments and the Bureau of Reclamation on how to address issues of effective governance in the CRB—especially with the opportunity of the 2026 renegotiations.

IV. Effective governance: Karuk tribe in the Klamath River Basin

Contextualzing Indigenous rights and involvement in water resource management is imperative because it allows for necessary steps to be taken toward equitable policy making and reform. For example, the Karuk Tribe, located in the Klamath River Basin of northern California, demonstrates an exemplary model for Indigenous collaborative governance in the context of water resource management. Collaborative governance is defined as "a devolved and participatory decision-making process that connects a broad set of parties to understand, deliberate over, and negotiate solutions to complex environmental problems" (Diver et al. 2022, 3).

In 2002, federal agencies approved water diversions in the Klamath River for agriculture to the detriment of the natural and endangered salmon habitat during a drought year. The resulting impact was a massive fish-kill crisis of salmon, which is an invaluable resource in Karuk tribal identity. What followed was a major turning point for Indigenous participation in regional governance. Through ongoing tribal advocacy and public pressure from allies across the scientific community, federal agencies were pressured into directly engaging with tribal perspectives (Diver et al. 2022, 6). Following this event, a years-long paradigm shift commenced in which both state and federal agencies promoted the Karuk Tribe to a key "stakeholder status" across water quality working groups, all while maintaining their sovereignty. In doing so, tribal participants have worked directly with federal and state systems to establish scientific consortiums and coalitions, obtain leadership roles, and enlist routine Indigenous monitoring systems for water-related challenges relevant to the Klamath River. Resultantly, in 2019 the Karuk Tribe established a resolution declaring the legal personhood of the Klamath River. This grants a legal pathway for the tribe to advocate for the protection of the biological health of the river (Smith 2019). This landmark action has set a standard for codifying Indigenous knowledge and shifting toward tribal-led governance structures.

III. Policy recommendations

Based on this analysis from the Karuk Tribe, there is much that can be translated into CRB water governance policy for the 2026 renegotiations. The state of policy in the Upper CRB has no single answer, but a positive evolution has a trajectory tending towards inclusivity of Indigenous peoples, collaborative governance, and the pairing of Western science-based and traditional Indigenous practices.

i. Encourage systems-based thinking

To incorporate inclusivity and Indigenous perspective into CRB law, it is recommended that the Bureau of Reclamation and state government lawmakers apply systems-based thinking in the 2026 renegotiations. Systems-based thinking embeds the rhetorical and discursive context of the CRB into the legislative issue at hand. In practice, lawmakers will apply systems-based thinking to critique their legislation holistically. When the 2026 renegotiations occur, lawmakers must focus on the CRB as a whole system with complex social and oppressive dynamics that require Indigenous input and knowledge.

When legislators narrow Western law to "what it is," they fail to acknowledge the political and historical context that forms our present (Munshi 2017, 235). Systems-based thinking directly opposes this simplicity and moves law away from the singular reliance on Western ideologies that perpetuate the exclusion of Indigenous voices in the CRB by upholding Eurocentric and racist values (Munshi 2017, 226). Systems-based thinking is vital to analyze patterns of oppression in the CRB to then inform potent and fruitful action (Valdes 2000, 139). Current legislation is expiring in 2026 and policy renegotiations must be built with a new focus.

Through systems-based practice, the lawmakers' renegotiations will ensure Indigenous input and perspectives are included and respected in law (Bair et al 2019, 17).

Indigenous Nations at the Confluence: Water Governance Networks and System Transformation in the Klamath Basin is notably effective in its literature review and subsequent inclusive concepts aligning with systems-based content (Diver et al. 2022). The following analysis is based on the aforementioned literature review and frames social networks in a meaningful and Indigenous-centered lens that combats the harmful discourse surrounding Indigenous peoples in Western culture.

The literature review prioritizes the "meaningful inclusion of Indigenous peoples in water governance set forth by Indigenous peoples themselves" (Diver et al. 2022, 13). Subsequently, the concepts of polycentrism and the two-eyed seeing approach distance systemic eurocentric and anthropocentric values—centering tribal communities' ideologies and decolonization in the writing of law. Furthermore, the system transformation (ST) frames the change in discourse overall to refocus and directly oppose biases in Western law. ST removes Western law's oppressive barriers to equality for tribes in the CRB (Feagin 2006, 21). Overall, the literature review completed creates a framework of inclusive concepts aligned with systems-based thinking (Table 3).

Inclusive legal scholarship must incorporate systems-based thinking to provide context and to challenge the status quo (Valdes 2000, 151). While the Klamath Basin literature review was conducted after law was implemented, its content is still vital.

Literature review	Informed research and education to build informed policy action and social network analysis
Two-eyed seeing approach	Communities learn from one eye of the Indigenous way of knowing and the other eye with Western ways of knowing for the benefit of all (Reid et al. 2021, 244)
System transformation (ST)	Deliberate creation of new governance structures that center Indigenous peoples and their knowledge system (Diver et al. 2022, 13)

Table 3: Key effective governance concepts and definitions.

Lawmakers involved in critical theory collectives and projects are well aligned to contribute to ST and apply the two-eyed seeing approach. Such lawmakers equip a fusion of theory and action against ingrained biases in Western law (Valdes 2001, 154). With such systems-based thinking, lawmakers are educated to frame law in tandem with Indigenous experience and knowledge using the two-eyed seeing approach. This two-eyed seeing approach moves occidental law closer to an ST where Indigenous tribes are reframed as both valuable and integral to the CRB. The two-eyed seeing approach expands the scope of law beyond the Western status-quo to the values and methods of key Indigenous communities. This systems-based thinking helps to formulate suitable legislative solutions and catalyzes an ST that will help to write 2026 renegotiations to include Indigenous communities. This is a major step forward beyond the systemic barriers that the Indigenous population faces in occidental law today.

Encouraging an ideological shift is more abstract than other policy recommendations. A perspective shift in lawmakers' thinking may feel intangible and unfeasible—especially in more conservative Western states like Wyoming and Utah. But by embedding this ideology in the process of creating law, more inclusive systems can be built. In the context of the CRB's upcoming renegotiations, systems-based thinking is a first step in the direction of inclusivity. Further recommendations on polycentric engagement and adaptive legislation sit upon a foundation of systems-based based thinking for current and future laws.

Still, lawmakers that employ systems-based practices do not serve as authority on Indigenous conflict in the CRB. In this vein, it is imperative to consider ethos. The voices and knowledge of Indigenous people are to be centered to effectively reframe law on the terms of Indigenous experiences. Systems-based thinking alone is not enough to properly reframe law because Indigenous voices are the most important aspect of legislative reform: collaboration and polycentric engagement across government and Indigenous entities is vital in addressing legislative renegotiations in the CRB.

ii. Polycentric engagement

Polycentric engagement involves independent and diverse centers of authority engaging across overlapping jurisdictions (Ostrom et al. 1961, 831). A literature review further focuses on CRB tribal inclusion via polycentrism, which provides a framework of collaboration and inclusion. While some scholars raise concerns over the efficiency of polycentric systems, it is a successful model for complex resource management problems because it enhances opportunities for community-driven collaboration, local experimentation, and stakeholder sovereignty through proper communication channels and mutual respect (Ostrom 2009, 39).

In the CRB, Indigenous tribes were not consulted when establishing the basin-wide commission (Mullane 2024). This legislative exclusion exemplifies the distinct separation of cultural communities as a result of narrowed, Eurocentric law. Intentional and explicit inclusion in law is required to combat Indigenous exclusion. Education on community-driven, inclusive practices like polycentrism that emphasize mutual trust facilitates a shift of ideologies ingrained in systems of power to more effectively address inequality in the CRB.

The work of the Karuk Tribe in the Klamath River Basin (KRB) further denotes the value of implementing multi-jurisdictional, polycentric engagement processes. The engagement process is characterized by the following procedure:

1. State and federal governing agencies identify tribal concerns regarding natural resource systems.
2. Agencies work with tribes to establish necessary coalition connections that encourage dense networks, constant communication channels, agreements of mutual support and management, and increased tribal capacity in science and policy.

Specifically, Karuk leaders have:

1. Engaged directly in 21 science-policy coalitions;
2. Built highly technical inter-tribal natural resource management programs;
3. Established the Klamath Tribal Water Quality Consortium and the Klamath Basin Monitoring Program;
4. Worked on Federal Energy Regulatory Commission (FERC) dam relicensing processes;
5. Designed their own science and policy teams to work on a range of water quality issues (Diver et al. 2022).
6. Been recognized as co-leaders of the basin-wide North Coast Resource Partnership (NCRP) consisting of county government officials.
7. Taken legal action to officially "recognize the legal personhood of the Klamath River under tribal law" (Smith 2019).

Each engagement effort pushed forward by tribal leaders has been established with the initiative to maintain polycentrism and multi-jurisdictional governance networks, in which tribal members not only have a reserved seat at the table but are also central contributors to a wide variety of science and policy information that is necessary for maintaining the long-term health, restoration, and revitalization of the river's natural resources. In establishing these networks, tribes may contribute new insights into traditional science and policy forums and gain agency in formal decision-making processes. This requires unanimous agreement, mutual trust, and understanding from all relevant parties. In doing so, these initial engagements have set a foundation for the Karuk to play a formal role in reshaping basin-wide legal discourse and agreements on resource sovereignty. By granting legal personhood to the river, the Karuk now have a legal means in California to take action against any ecological threat

posed onto the river, such as pollution or over extraction (Navarro and Cordalis 2019). Although the political landscape varies from the KRB to CRB, these engagement practices can act as a model for implementation by the Bureau of Reclamation and state governments during the 2026 planning, review, and renegotiation phases of CRB drought policy. It is further acknowledged that due to political constraints, there may be barriers to replicating this exact model in the CRB. However, by striving to embed polycentric, science-based, inclusive forums throughout the renegotiation process, states will take impactful steps toward improvements in Indigenous inclusion.

Additionally, while this has been a years-long process that required a deep shift away from colonialist legislative practices, polycentric engagement has been implemented with success across the KRB. Karuk tribe leaders demonstrate a high level of technical engagement to be equipped across coalitions, which can be feasible for CRB tribes if they were granted equal access by state agencies to funding, resources, agency, and support. This scheme does still operate under a Eurocentrist model that mandates a level of tribal compromise while engaging with federal and state systems. This model is meant to act as beginning steps toward extensive, lengthy engagement processes that do not act as a substitute for Indigenous autonomy in managing water resources.

iii. Adaptive legislature

Unlike in the example of the KRB, the CRB encompasses many states and tribal communities. Therefore, water governance concerns cannot be satisfied by a one size fits all legislation. It is a complex process to incorporate diverse combinations of regional landscapes, climate, local needs, federal and state governments, and Indigenous governance into policy formations. A possible solution to this is implementation of adaptive policy language.

In a study looking at the gap in global groundwater policy, researchers found a notable example in Australia's National Water Initiative (NWI) (Rohde et al. 2017, 293–301). The success of this legislation stems from its adaptive language which recognizes that many factors must be considered across diverse ecosystems when formulating effective management on a regional scale. The NWI necessitates a "whole water cycle" approach, which scales out from the immediate water issues of a region and considers how it fits into the water cycle as a whole. This not only permits restorative actions but also encourages consideration of the "downstream" effects of any action implemented. Lastly, science-based risk analysis and the use of water modeling assessment provide a measure of assurance that water management methods are likely to result in the desired effect. A similar initiative implemented at the federal or state level offers an adaptive framework to guide local water managers in creating water management plans while still allowing room to account for the specific needs and vulnerabilities of each region. Water managers may consist of local governments and the Indigenous communities of an affected region.

The benefit of this approach is how it provides guidance for regional water managers to make decisions that best fit their individual needs while still taking into consideration the whole system's effects. Utilization of proven risk assessment tools to judge the potential effectiveness of their proposals before execution allows for communities, such as Indigenous communities, to make informed choices. However, a possible drawback of this adaptive language is the room for interpretation of the framework provided. It is necessary to choose language mindfully so that it may not be vulnerable to misinterpretation or intentional manipulation. It is also necessary to allow a seat at the table for Indigenous voices to participate in the policy writing process.

Effective policy must consider the big picture to achieve the desired response and avoid creating new problems in the process. This goal may be achieved by implementing adaptive legislation. Including adaptive language, a "whole water cycle" approach, and science-based risk assessment throughout 2026 renegotiations can promote policies that are effective in meeting goals across diverse landscapes on a large scale while also addressing local needs. One such legislation noted in this paper as needing attention includes the revaluation of water allocations based on the current calculated drought condition water capacity of the region. This adaptive policy would be valuable in addressing the diverse regional water needs in the CRB and should therefore be integrated into the 2026 renegotiations.

The inclusion of language that promotes the involvement of Indigenous peoples and traditional practices alongside modern science and technology-based methods would enable the development of dynamic water policy needed for drought management.

III. Conclusion

These policy recommendations strive for the inclusivity of Indigenous peoples, collaborative governance, and the integration of Western science-based and traditional Indigenous practices. Their implementation will only be effective if policymakers engage Indigenous tribes in the Upper CRB as equals in both the legislative writing and implementation process. These methods are intended to catalyze collaboration and Indigenous inclusion from an educated and interdisciplinary perspective in governance, discourse, and science. With basin-wide drought response agreements and water cuts set to expire in 2026, all relevant parties have the opportunity to rewrite legislation in a way that enables Indigenous parties to be at the forefront of decision-making processes (Mullane 2024). Indigenous communities in the CRB possess critical nature-based knowledge on effective environmental management practices, and to exclude them from continued planning efforts will undoubtedly heighten threats to water security in the region in the years to come.

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Disclaimer: Authors' views do not necessarily reflect those of their respective departments or institutions. The authors declare no conflicts of interest.