



Food and Agriculture  
Organization of the  
United Nations



Global Water  
Partnership

# Observations and Key Messages on Water stress and human migration



**Migration options can improve capacity to adapt to water stress;  
agricultural adaptation strategies will affect the need to rely on migration.**

Migration is a universal and common process and is linked to development in multiple ways. When mainstreamed in broader frameworks, especially in development planning, migration can benefit the communities at both origin and destination. Migrants can and do support their home communities through remittances as well as the knowledge and skills they acquire in the process while contributing to the host communities' development. Safe, orderly and regular migration can contribute to agricultural development, economic growth, food security and rural livelihoods. Migration can also be a part of climate change adaptation efforts. Yet, those migrants who are poor and low-skilled face the biggest challenges emanating from migration that occurs on involuntary, unsafe and irregular basis.

In order to understand migration, develop policies, and monitor the results of these policies, accurate, reliable, and accessible is essential. There is a fast growing literature on almost all aspects of migration emanating from various sources, much of which remain subjective and unchecked.

The United Nations system has established an inter-agency group, entitled The Global Migration Group (GMG) with a view to promote the relevant instruments and norms related to migration and for coherent, holistic and coordinated approaches in dealing with international migration. Among the seven themes that the GMG has identified, improving the evidence base on migration and development tops the list. The group recognizes the need for and a lack of adequate data and research to monitor trends and to inform public policy.

FAO and GWP joined forces in order to support the ongoing efforts towards addressing international migration from a lens of water, agriculture and rural development and initiated a multi-phase effort. The first phase of this effort is a contribution to the enrichment of the migration-related evidence base.

This brief contains facts, observations, and messages based on a scientific review, which evaluated evidence of the relationship between water stress and human migration, and compared the geography of existing evidence against the regions where we expect future water stress to occur. The evidence came from 184 peer-reviewed publications, including literature reviews, qualitative and quantitative research, mixed-methods research, computer modeling, and comparative case studies.



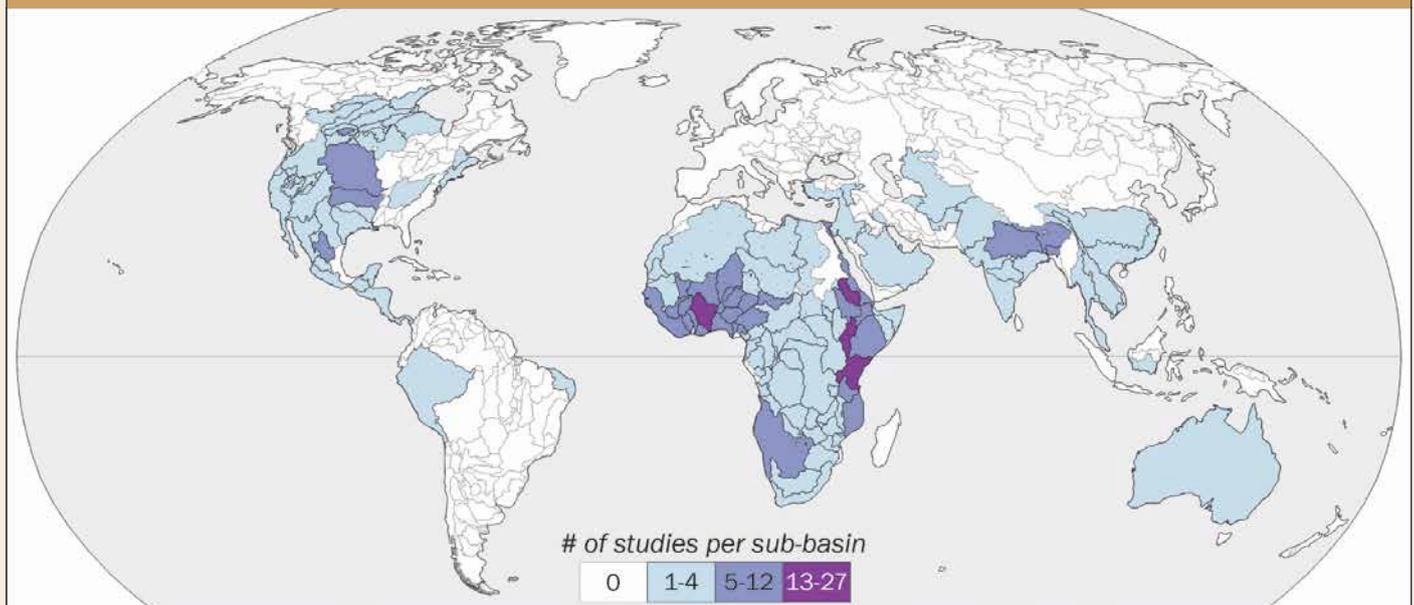
## Key observations from literature review

- In almost all societies on earth, migration is normal; development and humanitarian problems may occur when migration options are limited.
- Increased human migration rates (within and between countries) are a signal of smallholder agriculture problems.
- Declining agricultural production is one mechanism for translating water stress into migration; the impact of catastrophic flooding on homes or assets is a weaker predictor for migration.
- Temperature extremes are a multiplying factor for human migration, along with drought, increasing climate variability, or extreme rainfall and flooding; temperature extremes amplify the potential for migration across a range of water stresses.
- In some contexts, heat and drought are predictors of cross-border migration (e.g. Mexico and the United States); and in other contexts, heat and drought can be related to decreasing rates of migration (e.g. West Africa), suggesting that water stress can decrease social mobility and social relations that requires intervention to avoid acute humanitarian crises.
- Investments in agricultural adaptation to heat and water stress can moderate migration flows within and between countries.
- There are abundant examples where local- and national-level institutions have effectively mitigated out-migration following water stress.
- Drought-induced migration followed similar geographic routes as previous migration unrelated to drought.

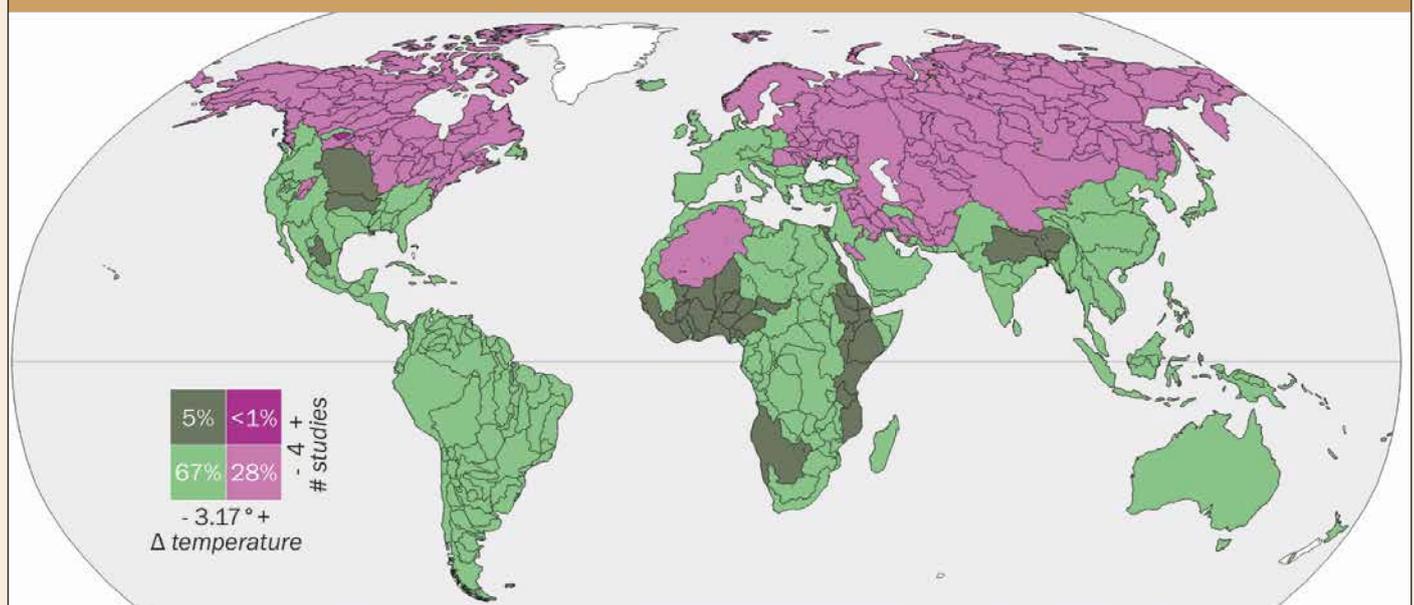
## Geography of evidence compared to future water stress

Study sites from 116 review papers were geocoded (Figure 1) and plotted against watershed sub-basin-level maps of indicators of water stress – modeled changes in surface temperature (Figure 2) and annual cumulative precipitation. These maps were examined to identify geographic disparities between existing regions where migration induced by water stress has occurred, and likely future regions of water stress. Given the likelihood of declining precipitation in combination with high temperatures by the mid-21st century, more research is needed in India, Central Asia, the Middle East and the Sahel.

**Figure 1.** The distribution of 116 geocoded reviewed publications across global sub-basins derived from HYDRO1k dataset (USGS, 2003).



**Figure 2.** The average change in near surface air temperature from 1951-1980 to 2041-2060 (based on CMIP5 multi-model ensemble outputs) measured within global sub-basins and compared to the number of review studies. Sub-basins are colored relative to whether projected changes in temperature exceed or fall below the sub-basin average increase of 3.17°C, as well as the number of review studies.



# Reviewed literature leads to three key messages for improving migration policies as a strategy for adapting to water stress:



## 1. Agricultural adaptation strategies will affect people's need to migrate

Various studies highlighted the link between agricultural problems and migration flows both within and between countries. Problems associated with uncontrolled urbanization can be managed with investments in rural agricultural adaptation and livelihood diversification programmes. Potential useful adaptation strategies include investments in drought- and heat-tolerant crop varieties, sustainable intensification, climate insurance tools, and rapid and targeted relief for crop losses. Sound migration policies require coordinated interventions and investment in origin, transit, and recipient economies.

## 2. A delayed migration reaction to water stress allows time for intervention

Migration rates (within and between countries) are signals of smallholder agricultural production problems, but by the time migration flows can be observed, the impact may be long past. Migration is usually a delayed response to water stress. Immediately after a water shock, the risk of migration is not high. However, it is possible that multiple shocks in a row increase the likelihood of migration. Rapid relief may serve an important role in complementing local adaptation strategies and livelihood diversification strategies.



## 3. Proactive adaptation is more effective and sustainable than a reactive humanitarian response

In some contexts (e.g. West Africa), heat and drought are related to decreasing rates of migration, suggesting that water stress can further impoverish communities and reduce social mobility. In such situations, interventions will likely be necessary to avoid further deterioration of livelihood conditions and acute humanitarian crises. Irrespectively, incorporating proactive measures in relevant socio economic frameworks and strategies are essential to address migration. Evidence shows that focused investments can slow both rural-urban migration and reduce the incentive to move across national borders.



These observations are taken from the joint FAO and GWP discussion paper, 'Water stress and human migration: a global, geo-referenced review of empirical research' by Wrathall, Van Den Hoek, Devenish, Walters (Oregon State University); FAO and GWP, March 2018, Rome, Italy.