



Planetary Security INITIATIVE



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Clingendael
Netherlands Institute of International Relations

APRIL 2017

Water, climate and conflict: security risks on the increase?

This briefing note explores the multidimensional relationship between water, climate change, human security and political conflict. The relationship between human security and water- and climate-related stressors such as floods, droughts and reduced food availability is quite straightforward. The relationships between water, climate and political conflict, however, are complex and depend strongly on political, economic, societal and cultural contexts. Water and climate conditions in the world are expected to change dramatically due to population growth, further economic development and climate change. It is projected that these developments will lead to increased water stress affecting conflict risks at local, national and river-basin levels. Also, the implementation of mitigation policies may unintentionally aggravate water stress and competition.

We draw the following five main conclusions:

- 1) The effects of climate change and future competition over water should be explicitly accounted for in current development policies at river basin, national and local levels.
- 2) The complexity of the climate-water-conflict interaction requires policy development processes integrating economic, mitigation, adaptation, social, and security policies.
- 3) Since local social and cultural contexts are crucial factors, the participation of local communities in policy development will be important for reducing security and conflict risks.
- 4) The river-basin scale remains key to reducing transboundary tensions, organising joint fact-finding processes and building cooperation between communities and countries.
- 5) The complexity of water, climate and conflict interaction – combined with expected (but uncertain) future developments and global commitments with respect to mitigation, adaptation and the Sustainable Development Goals (SDGs) – requires the development of a global cross-sectoral monitoring and evaluating process, fusing data, knowledge and experiences from local to global level. This may contribute to a better understanding, accelerate learning processes and fuel the development of promising strategies and measures to reduce future tensions and conflicts.

Increasing importance of water

Water plays a critical role in development strategies at global, regional, national and local levels. Many aspects of water can threaten human security, for example floods from rivers or the sea as well as water pollution, but water scarcity is regarded as the most important water issue in relation to political tension and conflict.¹ A sufficient and reliable water supply is needed for agriculture and households. It is also needed for industries and energy production. In situations where water has become scarce, competition over water (and the remaining fertile land) has the potential to spark tensions between users at levels ranging from local communities up to international river basins. Acknowledging the complexity of the interaction between the biophysical environment, human security and political conflict, this briefing note focuses on their possible interrelationships, considering also future climate change and social-economic developments (Figure 1).

The number of people affected by climate- and water-related disasters is significant but unevenly spread around the world.² For the period 2004-2014, 58% of disaster deaths and 34% of people affected by disasters have occurred in countries that also appear in the top 30 of the Fragile States Index. It has been estimated that between 1980 and 2015, there were 40,000 fatalities each year (on average) as a direct result of weather-related disasters. In the same time period, 175 million people were affected in other ways.³ In comparison, violent conflicts resulted in an average estimated at 80,000 fatalities per year in the period 1989-2015.⁴

Munich Re reported more than 1,000 natural disasters worldwide in 2015 – most of them water related (Figure 2A). Figure 2B shows that water-related conflicts, as reported by Adelphi, ranging from tensions and riots to armed conflict, are geographically less widespread than water-related natural disasters and fewer in number, with just 119 conflicts over the 1945-2016 period.⁵

It is expected that water stress will increase in the future: 1.6 billion people already live in countries with physical water scarcity and in the next two decades, this number may double for several reasons.⁶ First of all, population growth means that more people will be living in flood-prone or water-scarce areas. Second, economic development could increase the demand for water. Third, it is expected that, among other effects, global warming will lead to changes in precipitation patterns, and the distribution and types of extreme weather events. Finally, renewed mitigation policies following the Paris Agreement in 2015 may enhance the use of renewable sources of energy like energy crops and hydropower. As a result of these developments, flood risk and water-stress patterns may change, especially in parts of the world that are less prepared.^{7,8}

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- 1 IPCC (2014). Climate change 2014: Synthesis report, Contributions of Working Groups I, II and III to the IPCC Fifth Assessment Report, Summary for Policymakers. Genève, Intergovernmental Panel on Climate Change.
 - 2 Peters, K. and M. Budimir (2016). When disasters and conflicts collide. London, Overseas Development Institute.
 - 3 Centre for Research on the Epidemiology of Disasters (CRED) (2016). Emergency Events Database (EM-DAT).
 - 4 Melander, E., T. Pettersson and L. Themnér (2016). “Organized violence, 1989-2015.” Journal of Peace Research 53(5).

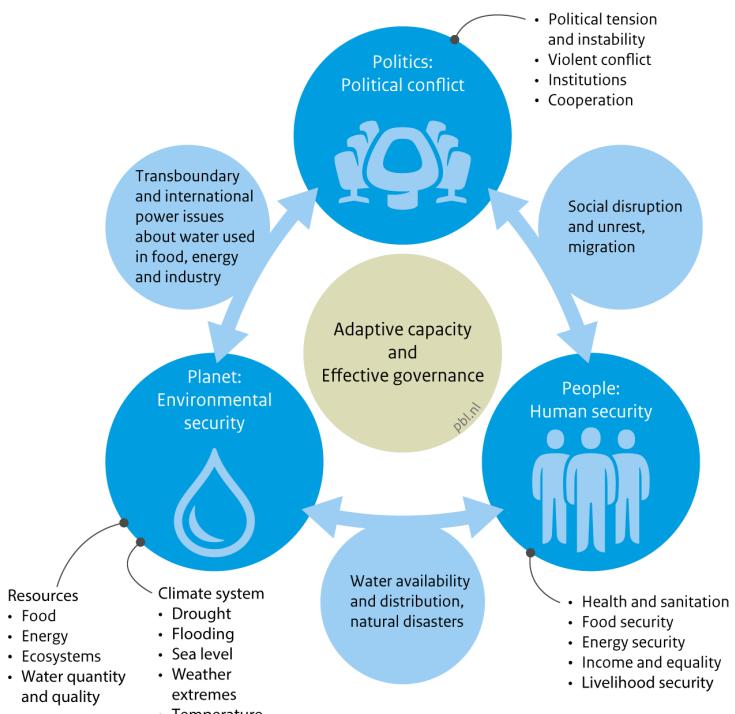
5 Lukas Rüttinger, Dan Smith, Gerald Stang, Dennis Tänzler and J. Vivekananda (2015). A New Climate for Peace: taking action on climate and fragility risks, Adelphi, International Alert, Woodrow Wilson International Center for Scholars, European Union Institute for Security Studies.

6 World Bank Group (2016). High and Dry: Climate Change, Water, and the Economy. Washington DC, The World Bank.

7 World Meteorological Organization (2016). The Global Climate in 2011-2015. Weather Climate Water. Geneva.

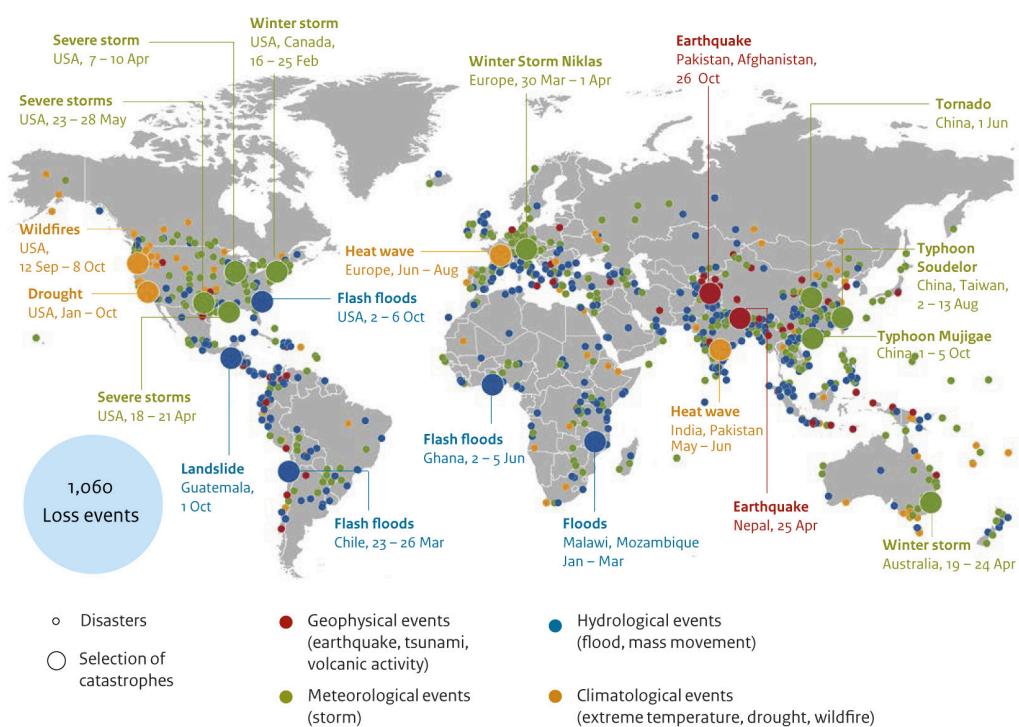
8 Jiménez Cisneros, B. E., T. Oki, N. W. Arnell, G. Benito, J. G. Cogley, P. Döll, T. Jiang and S. S. Mwakalila (2014). Freshwater resources. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, United Kingdom and New York, NY, USA, Cambridge University Press: 229-269.

Figure 1 Conceptual representation of the interactions between the physical environment, human security and political conflict. As explained in the text, the interactions are complex and context sensitive.



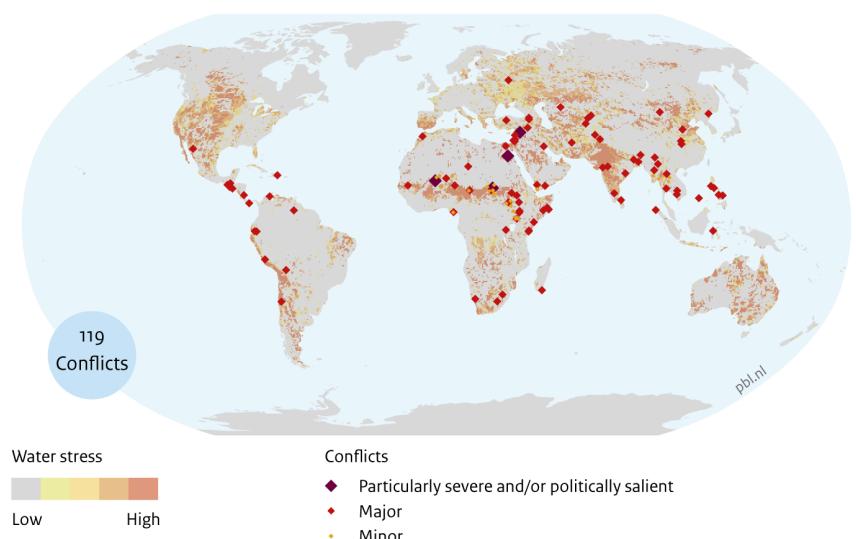
Source: PBL

Figure 2A Geographical overview of natural disaster events reported for the year 2015 by Munich RE (2016). Climate- and water-related disasters form a major part of the total.



Source: Munich Re, NatCatSERVICE, 2016

Figure 2B Overview of water-related conflicts over the period 1944–2016, as reported in *A New Climate for Peace*, combined with water-stress areas as given by Wada et al. (2011).* The timeframes of the shown conflicts and water-stress events at the same location do not necessarily coincide.



Source waterstress: Wada et al.; Computations: Utrecht University
Source conflicts: Adelphi Research Gemeinnützige GmbH (<https://factbook.ecc-platform.org>)

* Wada, Y., L. P. H. van Beek, D. Viveroli, H. H. Dürr, R. Weingartner and M. F. P. Bierkens (2011). "Global monthly water stress: 2. Water demand and severity of water stress." *Water Resources Research* 47(7): n/a-n/a.

Climate change and water issues high on the international agenda

Decades of debate and negotiations on climate policy led to the Paris Agreement 2015.⁹ Also, the relationships between climate change, water and its impact on human security, political stability and economic stability are receiving growing global attention. For example, the recent annual risk assessment reports by the World Economic Forum warn that failure to adapt to climate change is one of the major risks facing the world economic system.^{10,11}

Moreover, the Nobel Peace prize awarded to the IPCC (Intergovernmental Panel on Climate Change) was motivated by the possible role of climate change in enhancing conflict. The New Climate for Peace initiative, commissioned by the G7, and the installation of the Planetary Security Conference itself in 2015, also reflect this growing concern. Today's politicians, at all government levels, are increasingly aware of climate change and its possible impacts. But local cultural and social practices are often not sufficiently taken into account when mitigation and adaptation policies are developed and implemented, leading to maladaptive outcomes.¹²

Actions to address the impacts of climate change and improve human security are visible at all levels, ranging from irrigation

9 UNFCCC (2015). ADOPTION OF THE PARIS AGREEMENT, Proposal by the President - Draft decision -/CP.21, United Nations Framework Convention on Climate Change.

10 World Economic Forum (2011). Water Security: The Water-Food-Energy-Climate Nexus Island Press.

11 World Economic Forum (2016). The Global Risks Report 2016 Geneva.

12 Adger, W. N., J. Barnett, K. Brown, N. Marshall and K. O'Brien (2013). "Cultural dimensions of climate change impacts and adaptation." *Nature Climate Change* 3(2): 112-117.

projects for food production to health and energy programmes, and from local and national adaptation strategies to the adoption of universal goals such as the Sustainable Development Goals (SDGs) and the Sendai Framework for Disaster Risk Reduction. Many SDGs are directly or indirectly related to water. There are committees aiming to improve collaboration between countries bordering river basins to prevent the occurrence of flood events, water scarcity situations and water pollution. Such collaboration could reduce the chance of transboundary conflicts that might arise from *inter alia* the construction of dams for hydropower production and for irrigation. Several good examples of collaboration show that the (sub)river basin scale may be the suitable geographical scale for improving cooperation in future situations of tension and/or scarcity.¹³

Future socio-economic developments lead to increased water competition

Future economies might have a higher demand for water than today. First of all, population is projected to grow to nine billion in 2050. The World Bank estimates that demand for water for agriculture will rise by around 50%, urban water use will rise by 50%, and demand for water for energy production could increase by up to 85%.¹⁴ Also other studies show that under a business-as-usual socio-economic scenarios, water demand could increase which may lead, in some regions, to harsh competition over water resources and to changing power relations.¹⁵ It should be noted, however, that current water use is often quite inefficient. Therefore, scenarios that assume increasing efficiency can also show stable or even decreasing water consumption.

13 Brochmann, M. and N. P. Gleditsch (2012). "Shared rivers and conflict – A reconsideration." *Political Geography* 31(8): 519–527.

14 Ibid 6.

15 Harvey, M. and S. Pilgrim (2011). "The new competition for land: Food, energy, and climate change." *Food Policy* 36: S40–S51.

Global warming may lead to further water stress

Global climate change will affect water security through changes in precipitation patterns, evapotranspiration, and changes in extreme weather patterns. In general, it is expected that on average there will be more precipitation. The pattern of change, however, is very heterogeneous: some areas will have more precipitation, others less. In addition, higher temperatures will also increase the evapotranspiration rates. Studies on the impact of climate change (both through changing means and changing extremes) remain very uncertain. Depending on future global socio-economic developments, global mean temperature is expected to rise 3–5°C by 2100 in the absence of any new and stringent climate policies. Even if the ambitious targets of Paris are implemented, global mean temperature would still rise by 1.5–2°C compared to pre-industrial levels. Thus, despite effective mitigation policies many regions will nevertheless be affected by changing precipitation patterns and changing water availability.¹⁶

Mitigation responses following the Paris Agreement could also have consequences for water stress

Mitigation responses may intensify water stress in certain regions, thus impacting on water-related human security and political conflict. Depending on implementation, the increased use of hydropower could cause local conflicts due to involuntary displacements and ecological issues, or could interfere with the political interaction between countries in transboundary river basins. The increased production of biomass for bio-energy could also lead to intensifying competition for land and water for food production. Figure 3A shows regions where, in 2050, water stress could intensify due to

16 Ibid 1.

increased energy and food crop production. Figure 3B shows regions with significant potential for new hydropower facilities, indicating river basins where political conflict and tension over the construction of dams and use of water may be more likely,

especially in politically unstable or tense regions. In some transboundary river basins, for example the Nile basin, Mekong basin, and the Indus, Ganges and Brahma Putra system, political tensions around water seem to be building up rather than easing.

Figure 3A Regions where competition over land and water may intensify due to increased food and energy crop production in 2050.

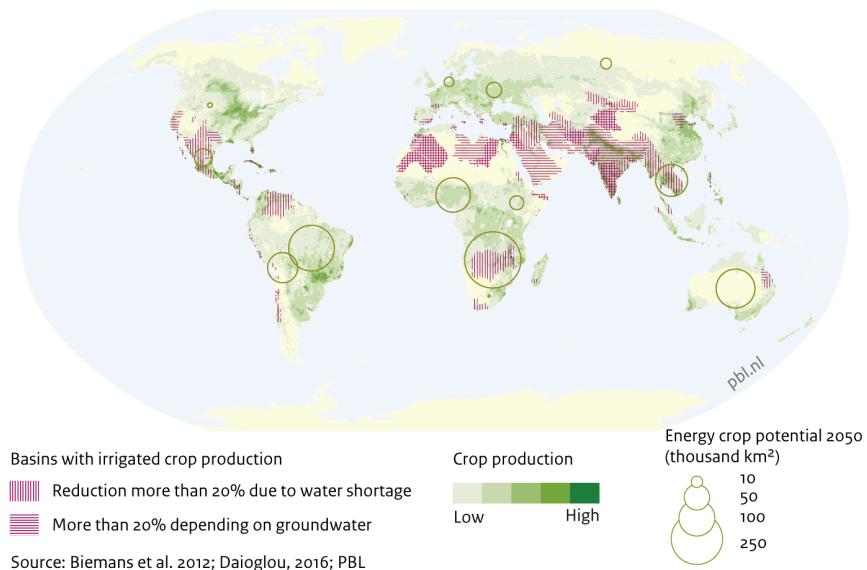
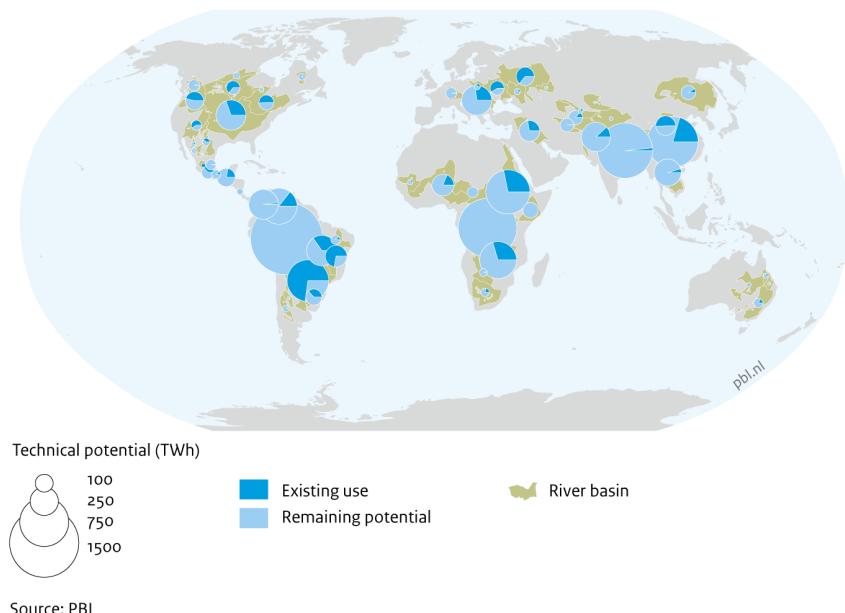


Figure 3B Regions where tensions on river basin level may intensify due to increased hydropower production.



What we know: different roles of water in political or violent conflict

In response to growing knowledge regarding climate change and its effects on the water system, international organisations, governments, universities and a broad spectrum of research institutes are giving more priority to understanding the relationships between climate change, water and security issues. This has resulted in a wide range of studies and methods. There is little dispute about the link between water and human security, and there is a high level of consensus on the significant increase in the impacts of water-related disasters and competition for water.¹⁷ Reducing the impacts of weather-related hazardous events is a major aim of climate adaptation and disaster risk reduction policies, which are supported on a global scale by the SDGs and Sendai Framework for Disaster Risk Reduction.

There is substantially less consensus in the scientific community regarding the interaction between water and political or violent conflict. Publications assessing the interaction between climate change factors and the role of water in political security provide different conclusions, reflecting not only differences in the focus and views of the authors, but also differences in the methods applied (qualitative or quantitative), the spatial and temporal scales, geographical focuses, the contexts of each respective study, and the variables selected. Different, sometimes even conflicting, perspectives are found in literature concerning the role of climate and water with respect to social disruption and conflict. These approaches do not per se exclude each other.

A main body of literature considers water as a subdominant factor in the conclusion of conflict studies. These studies highlight that conflicts result from a mix of factors, such as population size, demographic composition, governmental structures, poverty and inequality, ethnic fractionalisation, religious differences, history of conflicts in the area or presence of neighbouring conflict.^{18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29} These conclusions do not provide direct perspectives for action regarding the role of water in conflict but, following the pre-cautionary principle,

17 Adger, W. N., J. M. Pulhin, J. Barnett, G. D. Dabelko, G. K. Hovelsrud, M. Levy, Ú. O. Spring and C. H. Vogel (2014). Human Security. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, United Kingdom and New York, NY, USA, Cambridge University Press: 755-791.

- 18 Selby, J. and C. Hoffmann (2014). "Beyond scarcity: Rethinking water, climate change and conflict in the Sudans." *Global Environmental Change* 29: 360-370.
- 19 Theisen, O. M., H. Holtermann and H. Buhaug (2011). "Climate wars? Assessing the claim that drought breeds conflict." *International Security* 36(3): 79-106.
- 20 von Uexkull, N. (2014). "Sustained drought, vulnerability and civil conflict in Sub-Saharan Africa." *Political Geography* 43: 16-26.
- 21 von Uexkull, N., M. Croicu, H. Fjelde and H. Buhaug (2016). "Civil conflict sensitivity to growing-season drought." *Proceedings of the National Academy of Sciences* 113(44): 12391-12396.
- 22 Turner, M. D. (2004). "Political ecology and the moral dimensions of "resource conflicts": the case of farmer-herder conflicts in the Sahel." *Political Geography* 23(7): 863-889.
- 23 Gemenne, F., J. Barnett, W. N. Adger and G. D. Dabelko (2014). "Climate and security: evidence, emerging risks, and a new agenda." *Climatic Change* 123(1): 1-9.
- 24 Allouche, J. (2011). "The sustainability and resilience of global water and food systems: Political analysis of the interplay between security, resource scarcity, political systems and global trade." *Food Policy* 36: Supplement 1 3-8.
- 25 Bernauer, T. and T. Siegfried (2012). "Climate change and international water conflict in Central Asia." *Journal of Peace Research* 49(1): 227-239.
- 26 Butler, C. K. and S. Gates ibid."African range wars: Climate, conflict, and property rights." 23-34.
- 27 Gleditsch, N. P. Ibid."Whither the weather? Climate change and conflict." 3-9.
- 28 Schleussner, C.-F., J. F. Donges, R. V. Donner and H. J. Schellnhuber (2016). "Armed-conflict risks enhanced by climate-related disasters in ethnically fractionalized countries." *Proceedings of the National Academy of Sciences* 113(33): 9216-9221.
- 29 Theisen, O. M. (2012). Climate clashes? Weather variability, land pressure, and organized violence in Kenya, 1989-2004: 81.

this view would still warrant international efforts to ensure that activities in the field of mitigation and adaptation do not increase tensions.

A second group of studies underline the direct role of climate and water in political or violent conflicts. These studies statistically link the rise of conflicts to climatic and environmental changes; this supports the perspective of climatic change and changing water security being a major threat to security risks globally.^{30, 31, 32} In line with this group of scientific studies, more policy-oriented studies present global warming and water-related issues as the ‘ultimate threat multiplier’ for conflict³³ or label them as key drivers of conflict in the coming decade.³⁴

A third group of publications focus on water and climate change as an opportunity for peace. Some studies suggest that, although pressure on water resources and competition between countries might increase, there are many examples of collaboration in national or international river basins that result in better understanding and cooperation between parties with conflicting interests.^{35, 36, 37} These studies therefore indicate that future climate change may lead to conversations

and enhanced collaboration rather than to increased tensions and/or conflict.^{38, 39, 40, 41, 42}

Finally, there is an extensive number of studies providing examples of water being used as a weapon or powerful strategic tool in political conflict situations. For example, strategic destruction, occupation or poisoning of dams, wells or treatment plants occurred in Iraq, where ISIS closed dam gates to cut off water. In Brazil, landowners poisoned the wells of insurgent indigenous tribes.^{43, 44} And in 2014 Ukraine cut off the water supply of Crimea by closing the sluices in the North Crimean Canal, which led to acute water shortages, as Crimea receives 80% of its fresh water from that canal.⁴⁵

Water, climate and conflict in the future: security risks on the increase?

The above shows that the interrelationship between water, climate and political conflict is complex and dependent on regional, national or local contexts. Expected changes in important drivers like population growth, economic development and climate are likely to affect water stress and increase competition for water. Accepting that conflicts are often attributed to a combination of different causes, ranging

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- 30 Hsiang, S. M. and M. Burke (2014). “Climate, conflict, and social stability: what does the evidence say?” *Climatic Change* 123(1): 39–55.
- 31 Hsiang, S. M., K. C. Meng and M. A. Cane (2011). “Civil conflicts are associated with the global climate.” *Nature* 476(7361): 438–441.
- 32 Hendrix, C. S. and I. Salehyan (2012). Climate change, rainfall, and social conflict in Africa: 35.
- 33 Defence Intelligence Agency (2012). Global Water Security. Intelligence Community Assessment, Defence Intelligence Agency U.S.
- 34 Ibid 4.
- 35 Wolf, A. T. (2007). “Shared waters: Conflict and cooperation.” *Annu. Rev. Environ. Resour.* 32: 241–269.
- 36 Gartzke, E. (2012). “Could climate change precipitate peace?” *Journal of Peace Research* 49(1): 177–192.
- 37 Sletrebak, R. T. Ibid. “Don’t blame the weather! Climate-related natural disasters and civil conflict.” 163–176.
- 38 Wolf, A. T. (2007). “Shared waters: Conflict and cooperation.” *Annu. Rev. Environ. Resour.* 32: 241–269.
- 39 Gartzke, E. (2012). “Could climate change precipitate peace?” *Journal of Peace Research* 49(1): 177–192.
- 40 Matthew, R. (2014). “Integrating climate change into peacebuilding.” *Climatic Change* 123(1): 83–93.
- 41 Ibid 14.
- 42 Stefano, L. d., J. Duncan, S. Dinar, K. Stal, K. M. Strzepek and A. T. Wolf (2012). “Climate change and the institutional resilience of international river basins.” *Journal of Peace Research* 49(1): 193–209.
- 43 CNN (2015) “Iraq: ISIS fighters close Ramadi dam gates, cut off water to loyalist towns.”
- 44 Fox News (2012) “Brazil police investigate indigenous claim that creek in sacred land was poisoned.”
- 45 BBC (2014) “Russia fears Crimea water shortage as supply drops.”

from cultural, societal and political issues to growing competition for natural resources, we cannot ignore the fact that in the future water insecurity will play a greater role in conflict situations in areas prone to water scarcity, and also in areas affected by extreme events such as floods and droughts. Current violent conflicts, such as in Syria and Yemen, have been linked by several scholars to prolonged water scarcity.^{46, 47, 48} But several conflict researchers at most only partially endorse those claims, arguing that other factors such as political, economic and societal conditions undeniably play a dominant role.^{49, 50, 51, 52} Furthermore, changing geo-political relationships in the context of climate change can increase tensions between countries in transboundary river basins.^{53, 54, 55}

This political conflict is an example of how water in already politically tense regions can be used as an expression of power rather than a source for collaboration. Historically, examples of water used as means for repression are found in several conflicts, ranging from power struggles over water in the Israel-Palestine conflict, to tension between farmers and herders over water and land issues in a district of Kenya.^{56, 57, 58} Without action, these existing conflicts could intensify around water.

Uncertainties require better understanding of the interplay between future changes in the biophysical system and human security and political conflict risks

As has been shown, assessing the role of climate change and water with respect to social and political insecurity is complex, because of its intertwinement with regional, national and local cultural, political and socio-economic variables. We find publications stressing the importance of social, cultural and political contexts, publications arguing that climate change and water are a 'threat-multiplier', and publications demonstrating that (at river-basin scale) water may lead to collaboration rather than conflicts, while on the other hand, some publications show that in political conflict areas water often is used as a strategic tool. Most of the literature is based on historical or actual situations. In view of changing future conditions and the expected growing competition over water in the future, it is necessary to explore how the findings of these analyses could best be used to analyse the future development of conflict risks. To better deal with future

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- 46 Gleick, P. H. (2014). "Water, Drought, Climate Change, and Conflict in Syria." *Weather, Climate, and Society* 6(3): 331-340.
 - 47 Kelley, C. P., S. Mohtadi, M. A. Cane, R. Seager and Y. Kushnir (2015). "Climate change in the Fertile Crescent and implications of the recent Syrian drought." *Proceedings of the National Academy of Sciences* 112(11): 3241-3246.
 - 48 Robins, N. S. and J. Ferguson (2014). "Groundwater scarcity and conflict – managing hotspots." *Earth Perspectives* 1(1): 1-9.
 - 49 De Châtel, Francesca (2014). 'The Role of Drought and Climate Change in the Syrian Uprising: Untangling the Triggers of the Revolution.' *Middle Eastern Studies* 50, no. 4: 521-35.
 - 50 Gleick, P. H. (2014). "Water, Drought, Climate Change, and Conflict in Syria." *Weather, Climate, and Society* 6(3): 331-340.
 - 51 Robins, N. S. and J. Ferguson (2014). "Groundwater scarcity and conflict – managing hotspots." *Earth Perspectives* 1(1): 1-9.
 - 52 Kelley, C. P., S. Mohtadi, M. A. Cane, R. Seager and Y. Kushnir (2015). "Climate change in the Fertile Crescent and implications of the recent Syrian drought." *Proceedings of the National Academy of Sciences* 112(11): 3241-3246.
 - 53 Rahaman, M. M. (2012). "Hydropower ambitions of South Asian nations and China: Ganges and Brahmaputra Rivers basins." *International Journal of Sustainable Society* 4(1-2): 131-157.
 - 54 Stefano, L. d., J. Duncan, S. Dinar, K. Stal, K. M. Strzepek and A. T. Wolf (2012). "Climate change and the institutional resilience of international river basins." *Journal of Peace Research* 49(1): 193-209.
 - 55 Bagla, P. (2010). "Along the Indus River, Saber Rattling Over Water Security." *Science* 328(5983): 1226-1227.
 - 56 Pacific Institute Water Conflict Chronology Timeline.
 - 57 Zeitoun, M. (2008). *Power and water in the Middle East: The hidden politics of the Palestinian-Israeli water conflict*, IB Tauris.
 - 58 Campbell, D. J., H. Gichohi, A. Mwangi and L. Chege (2000). "Land use conflict in Kajiado District, Kenya." *Land Use Policy* 17(4): 337-348.

uncertainties in developing strategies at local, national and regional levels, a better understanding is needed of the interplay between the biophysical system and the social and political system, and the possible consequences of future developments under different scenarios. Such a search for better understanding would require increased interaction between scientific, societal and political communities, further integration of scientific domains, and the building of a shared knowledge base fusing knowledge from local to global scale. We suggest the following focal points to improve knowledge building and understanding, and to build and improve collective capacity to develop risk-reducing strategies.

Integration of expected future changes in water impacts in development and security policies

If at local, national and regional levels the negative effects of climate change through sea level rise and the future competition over water would be explicitly acknowledged in development and security policies, this could help to reduce future security and conflict risks. In this paper we have focused on water scarcity and political conflict, but sea level rise and deterioration of water quality are serious threats as well. Sea level rise will affect small island states and coastal regions, and result in increasing displacement and migration of people.⁵⁹ In Bangladesh alone, sea level rise could result in the displacement of more than 20 million people, posing an enormous challenge to the national and regional community.⁶⁰ The availability of water is determined by both volume and quality. In many regions without proper management, water quality is expected to deteriorate due to increased pollution, thus affecting the availability of clean water for human and economical use.⁶¹

Available data and models allow for increasingly better analyses of present situations and future developments on different scales. Therefore, in policy development processes, responsible institutions can benefit from an improved science-based understanding of present and future challenges.

Integration of science and policy domains to improve understanding and build effective response mechanisms

The challenge for the coming years respect to climate change, water and conflict will be achieving a better understanding of the interplay between water, other contextual factors and human and political security. Both improved scientific understanding and bridging scientific, political and societal communities may be needed in order to reduce future climate- and water-related security risks. Building a better and shared understanding would thus require joint efforts from scientific, societal and political communities geared to improving: i) our knowledge of the causal and contextual factors involved; ii) awareness of potential 'hotspots' now and in the future; and, iii) insight into options for preventive strategies and actions in the short and long term.

As stated above, the literature shows that social and cultural dimensions are important factors in conflicts, and that the engagement and empowerment of civil society and local communities in local and national policy development is of importance for successful water and land management strategies that will also reduce the risks of social disruption and violent conflict.⁶² Insight into experiences of these more integrated and participative approaches in different regions and at different levels may improve understanding and fuel learning processes as a basis for more effective response mechanisms.

59 Ibid 1.

60 Ministry of Environment and Forests (2009).
Bangladesh Climate Change Strategy and Action
Plan 2009, Government of the People's Republic
of Bangladesh.

61 OECD (2012). OECD Environmental Outlook
to 2050; the consequences of inaction,
OECD Publishing.

62 Yasuda, Y. (2015). Rules, norms and NGO Advocacy
Strategies. Hydropower Development on the
Mekong River. London, Routledge - Earthscan.

River basins remain key for adequate transboundary management in reducing conflict risks

Transboundary river basins cover half of the global surface area, hosting 40% of the world's population, and encompassing more than 260 transboundary rivers and lakes in 145 countries. The growing competition for water due to rising demand for agricultural and energy production, and household and industrial use, requires better cooperation within transboundary river basins and lakes, especially in regions with high population growth and increasingly negative effects of climate change. As mentioned above, in some transboundary river basins like the Nile basin, the Mekong basin, and the Indus, Ganges and Brahma Putra system, political tensions around water seem to be building up rather than easing, underlining the need for functioning and effective river-basin committees and for political commitment from the countries involved. A shared understanding of both the physical constraints and options in the transboundary setting, and the economic, social and cultural setting of countries and peoples, is key to developing consistent policies and reducing conflict risks.

Tracking security risks and improving the collective ability to assess and prevent future tensions and conflicts

Building on the above, a potentially forceful and important further step to fuel and accelerate learning processes, and bridge different levels and communities, could be the development of a global reflexive monitoring and evaluation process focusing on security risks: how are we (the world community) doing with respect to water,

climate and human security and political conflicts in various regions? What progress is being made in reducing risks? What strategies are applied, what can we learn from them and what do they mean for future security risks? On a global scale, there are processes, for instance, around global biodiversity (Global Biodiversity Outlook reports) and global environmental quality (Global Environmental Outlooks). And following the Paris agreement, the SDG agreement and the Sendai agreement processes are expected to be designed focusing on monitoring and evaluating respective global commitments.

In 'de-risking' the world following the Paris 2015 agreement, explicit attention must be given to policy outcomes in terms of human security and political conflict. In building a reflexive process focusing on security issues, the involvement of scientific domains (bio-physical world), social and policy domains, economic and funding domains, military and security domains, and non-governmental and grassroots organisations would be required. Building such a transdisciplinary and inclusive community with reflexive mechanisms will be an important condition for joint fact-finding processes, bridging science and practice, and improving understanding of the links between water, climate, climate policies and tensions and conflicts at different levels. How such a multi-scale and multi-community reflexive process could be facilitated is still an open question. Given the global efforts on building monitoring and evaluation processes following the Paris and Sendai agreements and the adoption of the SDGs, the involvement of international organisations such as UN bodies seems of importance.

About the Planetary Security Initiative

The Planetary Security Initiative aims to help increase awareness, to deepen knowledge, and to develop and promote policies and good practice guidance to help governments, the private sector and international institutions better secure peace and cooperation in times of climate change and global environmental challenges. The Initiative was launched by the Netherlands Ministry of Foreign Affairs in 2015 and is currently operated by a consortium of leading think tanks headed by the Clingendael Institute.

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The briefing note is also part of a project for the Netherlands government on global water challenges. For more information, please contact Willem Ligtvoet willem.ligtvoet@pbl.nl or Karen Meijer karen.meijer@deltares.nl