

Cambio climático y seguridad: riesgos físicos y geopolíticos

Resumen:

La repercusión del cambio climático en el planeta es un problema muy complejo que añade presión a las tendencias actuales como la globalización, la demografía, las tensiones geopolíticas o la utilización creciente de recursos naturales. Esta presión está originando un cambio el escenario geoestratégico, operacional y táctico con importantes repercusiones sobre la seguridad, la defensa y las Fuerzas Armadas.

Durante los últimos años, el estudio de la relación ente el cambio climático y la seguridad ha despertado un interés creciente tanto en la comunidad científica como en las instituciones políticas nacionales e internacionales. A los riesgos asociados por la repercusión de los efectos físicos del cambio climático sobre las poblaciones e infraestructuras como inundaciones, sequías o elevación del nivel del mar, se añaden los riesgos geopolíticos como consecuencia del camino emprendido para la mitigación, en donde la digitalización y la descarbonización de las economías constituye las base para llevar a cabo la transformación necesaria para evitar el calentamiento global.

Palabras clave:

Cambio climático, seguridad, riesgo climático, calentamiento global, sequías, inundaciones

How to cite this document:

HIDALGO GARCÍA, Mar. Climate change and security: physical and geopolitical risks. IEEE Analysis Paper 49/2021.
https://www.ieee.es/Galerias/fichero/docs_analisis/2021/DIEEEA49_2021_MARHID_Cambio_E NG.pdf and/or [bie³ link](#) (consulted day/month/year)

First approach: direct effects of climate change on national security

Climate change is a common denominator in all national security strategies published in recent years. Regardless of whether it is treated as a challenge, risk or threat, the physical effects of climate change are affecting the geography and ecosystems of countries and will do so more severely in the future.

In this sense, we are presented with the extreme case of small island states (SIDS) where a rise in sea level may endanger one of the state's basic attributes, namely territory, which may even disappear, causing inhabitants to become¹ stateless. In other countries, sea level rise can increase saline intrusion, jeopardising delta farming patterns, with serious economic repercussions. This is particularly worrying in Egypt.

In other regions, rising seas threaten the livelihoods of coastal populations, causing thousands of people to move inland. Bangladesh would be a case in point.

The physical effects of climate change, such as increasingly adverse and frequent meteorological phenomena, could also affect a country's critical infrastructures — energy, communications, health or transport — causing supply interruptions with implications for the activity of the population and even for national security by affecting military infrastructures. In the case of the US for example, Hurricane Ida, which hit several parts of the East Coast — including New York City — caused devastating flooding and infrastructure damage, resulting in a hundred fatalities. A recently published report estimates that a quarter of critical infrastructure in the US including hospitals, police stations, fire stations, airports, highways and manufacturing industries are at risk of flooding².

The emergence of prolonged droughts is also one of the consequences of climate change of greatest concern due to its negative socio-economic consequences and the need for urgent measures to mitigate its effects in some river basins³. In this case, risk analysis and proper water resource management is also vital to maintain the well-being of populations and to maintain productive systems.

¹ <http://www.acnur.org/que-hace/cambio-climatico/>.

² https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3934475

³ <https://www.dsn.gob.es/es/actualidad/sala-prensa/adoptadas-medidas-urgentes-para-mitigar-efectos-sequ%C3%ADa-algunas-cuencas>

Apart from droughts, many water systems rely on annual snow cover and glacier run-off to supply freshwater; however, these sources are expected to experience significant declines, with an estimated 15% reduction in snow cover by 2100⁴. As global temperature increases reduce snowfall and lead to the permanent loss of glaciers worldwide, the negative effects of reduced melt will affect the water security of countries such as China and India that depend on glaciers in the Himalayas.

The above situations are some examples of how the physical effects of climate change can have direct repercussions in the field of national security, which can be more or less serious depending on the vulnerability of countries, how they adapt strategies and the risk analyses carried out to avoid or minimise socio-economic damage and deterioration of critical infrastructures that can be generated.

Second approach: physical effects of climate change as risk multipliers in fragile regions

Over the last few years, the traditional environmental dimension of climate change has been joined by the economic dimension — due to the need to move towards a decarbonised economy — and the security dimension. In relation to this last dimension, climate change has been seen as a threat multiplier as it contributes to aggravating situations that give rise to conflicts, such as poverty, scarcity of natural resources or loss of livelihoods.

Since Ban Ki-moon's 2007 declaration that the Darfur conflict was linked to climate change⁵, the security dimension has attracted increasing interest from the international community and states because of its relevance to national security. Since then, numerous scientific studies have attempted to link the consequences of climate change to the emergence of conflict or insecurity. Leading think tanks are also trying to delve deeper into this complex relationship between climate change and security.

Some of these scientific studies directly link the consequences of climate change, such as temperature variations, to armed conflicts throughout history. In the case of Africa, scientists have examined in depth the relationship between temperature and conflict in sub-Saharan Africa in the period between 1980 and 2002, concluding that warmer years

⁴ <https://www.businessofgovernment.org/blog/water-security-risks-and-national-security-implications>

⁵ <http://www.washingtonpost.com/wp-dyn/content/article/2007/06/15/AR2007061501857.html>.

saw an increase in conflict and quantifying it: an increase of 1°C meant a 4.5% increase in civil wars. Based on this historical series, projections indicate that by 2030 there would be a 54% increase in civil wars with 393,000 more casualties in sub-Saharan Africa⁶.

Other authors have conducted a study linking conflicts in Asia and Africa to droughts during the period from 1989 to 2014. It concludes that the risk of conflict increases with each additional year of drought, particularly in the least developed countries. If all other factors do not vary, the authors estimate that five consecutive years of drought increases the likelihood of conflict by between 12% and 15%⁷.

A recent study published in September 2017 also establishes a link between droughts and conflict in sub-Saharan Africa, estimating an increased probability of 10-50% depending on the stability of the country, its water resources or ethnicity. The authors conclude that drought is like adding fuel to ‘flames that are already burning’⁸.

However, despite the scientific basis of these projections, these data should be taken with some caution as they do not take into account political and economic variables or adaptation policies that may be established in the future. It can therefore be deduced that it is very difficult to establish a direct and simple link between climate change and the emergence of conflict. In order to address all this complexity, the first approach to relate climate change to security is to consider it as a ‘risk multiplier’⁹ as it contributes to generating situations of food insecurity, resource scarcity, population movements that can subsequently generate conflicts and increased radicalisation depending on the vulnerability of populations. The advantage of this approach is that it can consider the uncertainties (political and economic) that need to be taken into account when analysing the consequences of climate change and its potential for causing instability. It is thus possible to pin-point the ‘hot spots’ or ‘risk zones’, and therefore focus efforts to prevent a violent situation caused or aggravated by the consequences of climate change.

Although many of the risks associated with climate change lack precise and accurate statistics on their likelihood of occurrence and their impact on populations, it is possible

⁶ BURKE, Marshall B., and col. ‘Warming increases the risk of civil war in Africa’, *PNAS*, December 2009, vol. 106, No. 49. Available at: www.pnas.org/cgi/doi/10.1073/pnas.0907998106.

⁷ UEXKULL, N., and col. ‘Civil conflict sensitivity to growing-season drought’, *PNAS*, November, 2016, vol. 1113, issue 44, pp. 12391-12396. Available at: www.pnas.org/cgi/doi/10.1073/pnas.1607542113

⁸ Université de Genève. ‘Drought: A cause of riots’. *ScienceDaily*, 26 September 2017.

<www.sciencedaily.com/releases/2017/09/170926090530.htm>.

⁹ <https://www.climate-diplomacy.org/news/what-quantitative-analyses-tell-us-about-climate-change-and-conflict>.

to estimate the magnitude of the consequences that may occur in the long term¹⁰. This risk-based approach makes it possible to establish the interdependencies that are necessary to consider the security risks associated with climate change, taking into account the vulnerability of populations¹¹.

This impact on security will depend not only on the phenomena produced by climate change but also on the vulnerability and adaptive capacity of the populations. For this reason, in order to address the problem from a political, developmental and security point of view, it is important to study the political, economic and social context of the regions affected by climate change-related phenomena in order to assess their impact on generating insecurity.

If these geographic impacts are cross-referenced with country fragility data¹², many of the most fragile states are located in areas that are exposed to the negative impacts of climate change, such as the Sahel, East Africa and the Middle East. Small island developing states (SIDS) are an extreme case of the impact of climate change. Rising sea levels may jeopardise one of the basic attributes of the state, namely territory, and lead to situations of statelessness¹³. With the opening of trade routes and the exploitation of resources, the Arctic is an example of this situation.

Tension between herders and livestock farmers is very common in West Africa and can lead to cross-border conflicts. On their established routes, herders negotiate access and comply with legislation regulating access to resources. However, when these routes are changed, conflicts – in some cases very violent – arise over water and pasture with other groups already present in the area. Examples of such conflicts can be found in Kenya, Ethiopia, North Sudan and South Sudan¹⁴.

The Sahel area is a representative example of the relationship between climate change and the emergence of conflicts between herders and farmers¹⁵. Intense droughts, land degradation and desertification have caused the nomadic Fulani group to extend their

¹⁰ 'Climate-related security risks. Towards an Integrated Approach'. SIPRI. October 2016.

¹¹ Ibid.

¹² <https://fragilestatesindex.org/>

¹³ <http://www.acnur.org/que-hace/cambio-climatico/>.

¹⁴ <https://www.sipri.org/sites/default/files/Policy-brief%2C-Climate-change-and-violent-conflict%2C-April-2016.pdf>.

¹⁵ <http://www.nsrp-nigeria.org/wp-content/uploads/2017/03/Land-Conflict-and-Climate-Patterns-in-Nigeria.pdf>.

routes into southern Mali and northern Burkina Faso, into Nigeria, Benin, Ghana, Cameroon and Côte d'Ivoire¹⁶.

In recent years, Central American countries have also been affected by severe drought as a result of the El Niño phenomenon, which is enhanced by climate change. Guatemala, Honduras and El Salvador are part of the region known as the 'dry corridor', an area particularly vulnerable to the effects of climate change and where around 1.6 million people face food security problems¹⁷.

The main consequence of this drought is the reduction in agricultural production with losses of staple grain crops of between 50 and 90%¹⁸. This drop in production also creates a risk of resource depletion, decreases diversity and decreases energy intake. The result is loss of livelihoods, impoverishment and migration to urban centres. In fact, in this area, hunger is the main cause of migration to the US¹⁹.

Where resource management is not effective and equitable, the risk of instability or conflict arising from climate change is greater. The most ethnically divided countries can be found in Africa and Central Asia. In the case of Africa, the 20 most ethnically fragmented countries are located on the continent²⁰. Ethnic fragmentation is one of the main risks that lead to armed conflict. Almost two thirds of the civil wars since 1946 have had an ethnic component²¹.

Many of these climate change-related factors also play a role in terrorist recruitment. Hunger and the destruction of traditional livelihoods lead young people to fall into the hands of terrorist groups as they perceive that a life of dignity and freedom from want is the only option, as is the case in the Sahel or Somalia.

Once the risks of the physical effects of climate change are known and the vulnerabilities of the least developed countries are studied, adaptation can be a preventive diplomacy tool to avoid the emergence or worsening of conflicts. Hence, UN Secretary General

¹⁶ www.springer.com/cda/content/.../9783642292361-c2.pdf?

¹⁷ <http://www.fao.org/3/a-br092s.pdf>.

¹⁸ Ibid

¹⁹ http://www.oas.org/en/media_center/press_release.asp?sCodigo=E-065/17.

²⁰ ALESINA, Alberto F.; EASTERLY, William; DEVLEESCHAUWER, Arnaud; KURLAT, Sergio and WACZIARG, Romain T. 'Fractionalization' (June 2002). Harvard Institute Research Working Paper No. 1959. Available at SSRN: <https://ssrn.com/abstract=319762> or <http://dx.doi.org/10.2139/ssrn.319762>.

²¹ <http://www.climatechangenews.com/2016/07/25/climate-disasters-linked-to-inter-ethnic-conflict/>.

Antonio Guterres has declared that: "*Adaptation cannot be the neglected half of the climate equation*".²²

Third approach: geopolitical risks related to climate change

As explained in the previous sections, the risks associated with climate change are complex as their effects are multiple and varied (droughts, floods, rising sea levels, adverse weather events, etc.); they are multidimensional, ranging from local to global; and have short, medium and long-term implications.

For some experts, categorising climate change as a threat/risk multiplier is too generic and too limited in its ability to provide a policy response²³. In this regard, it is worth noting that financial markets treat climate change as a risk to the global economy. Financial markets need clear, accurate and comprehensive information on the impacts of climate change. This information includes not only the risks but also the opportunities presented by rising temperatures, climate-related policies and emerging technologies²⁴.

In 2015, the Task Force on Climate-Related Financial Disclosures (TCFD) set up by the Financial Stability Board (FSB)²⁵ established a definition and categorisation of climate change risks that has become a reference standard²⁶. According to this Task Force, risks related to climate change can be divided into two main categories: physical risks and the risks of economic actors transitioning to a decarbonised economy. The former include both risks arising from the current increase in extreme weather events and long-term impacts as a consequence of changing climate characteristics and rising temperatures.

²² <https://unfccc.int/es/news/antonio-guterres-la-adaptacion-necesita-el-50-de-la-financiacion-climatica>

²³ Available at: <https://policyexchange.org.uk/climate-change-as-a-growing-force-in-geopolitics/>

²⁴ Available at: <https://www.managementsolutions.com/sites/default/files/publicaciones/esp/gestion-riesgos-cambio-climatico.pdf>


²⁵ The Financial Stability Board (FSB) coordinates at international level the work of national financial authorities and international financial standard-setting bodies. The Council develops and promotes the implementation of effective policies in the supervision and regulation of the financial sector.

<https://www.bde.es/bde/es/areas/supervision/actividad/FSB/FSB.html>

²⁶ <https://assets.bbhub.io/company/sites/60/2020/10/FINAL-2017-TCFD-Report-11052018.pdf>

Risks included in the second category can be further divided into legal, technological, market and reputational risks.



CLIMATE CHANGE AND SECURITY: PHYSICAL AND GEOPOLITICAL RISKS



Climate change is the greatest challenge facing humanity



DIRECT RISKS TO NATIONAL SECURITY

In the future, the physical effects of climate change will affect countries' ecosystems and critical infrastructures, including military installations





RISK MULTIPLIER IN FRAGILE REGIONS


Climate change has been considered as a threat multiplier, as it contributes to worsening situations that give rise to conflicts, such as poverty, scarcity of natural resources or loss of livelihoods.

GEOPOLITICAL RISKS



The advance towards decarbonisation and electrification is reshaping a new world order and commercial relations, creating new sources of conflict



The lack of good governance in shared natural resources can lead to unilateral actions by one power to the detriment of others.

Autora: Mar Hidalgo, IEEEE

Analysing this risk posed by climate change to financial markets serves as a starting point for David Petraeus and Benedict McAleenan to establish a framework for addressing climate change risk from a geopolitical perspective²⁷. They state that geopolitical risks of climate change can be divided into three areas. The first is the physical impacts of climate change which include, for example: rising sea level and resulting floods, desertification, crop failures, changes in monsoons, displacement of species and the emergence of new pathogens.

The second area concerns transition risks, which refers to the risks associated with preparing societies and their economies for the challenge of switching from fossil fuels to renewable energy. These risks take into account geopolitics, trade relations, economic development and security issues. The move towards decarbonisation and electrification is reshaping a new world order and trade relations with new sources of tension are opening up. For example, the strategies being undertaken by major powers to secure the availability of critical minerals — such as lithium or rare earths — to advance the green and digital transformation of their economies. Oil-exporting countries

²⁷ <https://policyexchange.org.uk/climate-change-as-a-growing-force-in-geopolitics/>

must also redirect their economies to compensate for possible economic losses and, even worse, a diminished role on the international stage.

And the third area refers to liability risks as climate change causes a change in ecosystems and affects the scarcity of natural resources, including a vital resource such as water. These liability risks create a challenge that requires cross-border governance in the diplomatic, economic and, potentially, military spheres. Lack of good governance over shared natural resources can lead to unilateral actions by one power to the detriment of others. Some of the major hydrological dam construction projects currently under way may pose this type of risks in cross-border basins.

Climate change in the UN Security Council and in Defence

All these situations reinforce the idea that the relationship between the physical effects of climate change and the emergence of conflict exists but that it is very complex, as underlying structural causes such as low socio-economic status, poor governance or ethnic divisions, as well as the vulnerability of populations, must also be taken into account.

This complexity has meant that the UN Security Council has so far failed to pass a specific resolution addressing the impact of climate change on international security. Even so, several debates have been held on the subject and some specific resolutions have been adopted that have considered the role climate change has played in aggravating several specific conflicts such as the Lake Chad Basin, Somalia, Mali, Sudan, Central African Republic (CAR), Democratic Republic of Congo (DRC), Iraq (2561) and Cyprus (2587). The latter two are the first cases in which the Council recognised the effects of climate change in non-African contexts.

Members disagree on the question of considering climate change as a security issue within the UN Security Council. China and Russia, with veto powers, and India oppose this on the grounds that there are other bodies within the UN that deal specifically with climate change and sustainable development, such as the General Assembly or the

UNFCCC, and that they are therefore not matters to be dealt with in a body dedicated exclusively to peace and international security issues²⁸.

This ambiguity was already reflected in General Assembly resolution 63/281 (2009) entitled 'Climate Change and its possible security implications'. On the one hand, the resolution states first that: '*Recognizing the respective responsibilities of the principal organs of the United Nations, including the primary responsibility for the maintenance of international peace and security conferred upon the Security Council and the responsibility for sustainable development issues, including climate change, conferred upon the General Assembly and the Economic and Social Council*', but subsequently concluding: '*Invites the relevant organs of the United Nations, as appropriate and within their respective mandates, to intensify their efforts in considering and addressing climate change, including its possible security implications.*'

Given the difficulty of dealing with the impact of climate change on security within the UN Council, in recent years various expert groups have been set up to informally address this issue in order to study how climate change interacts with political, social and economic challenges that can contribute to generating situations of instability. These groups include the *Climate-Security Mechanism* created in 2018, the *Group of Friends on Climate Security* created in 2018, and the *Informal Expert Group of Members of the Security Council*, created in early 2020. This last group has met on several occasions. The first in November 2020 to address the implications of climate change in Somalia; India did not participate and Russia declared that it was acting only as an observer. The second took place in March 2021, this time to address the situation in the Sahel. Russia did not attend and India and China participated as observers. In April 2021, the third meeting was held to address South Sudan's floods and droughts as factors that may increase the risk of conflict and aggravate tensions between herders and livestock farmers. As on previous occasions, Russia did not attend and China and India attended as observers²⁹.

As well as being an issue that is starting to be addressed within the UN Security Council, over the past few months defence ministries have shown increasing concern and

²⁸ <https://www.un.org/press/en/2021/sc14644.doc.htm>

²⁹ https://www.securitycouncilreport.org/atf/cf/%7B65BF9B-6D27-4E9C-8CD3-CF6E4FF96FF9%7D/climate_security_2021.pdf

involvement in addressing the challenge of climate change both from the point of view of adaptation and mitigation as well as geopolitical risks.

Defence must preserve its capabilities despite the implications of climate change while being a major player in achieving greenhouse gas reduction targets. The changing environment also calls for proactive efforts to respond to new risks related to climate change, not only physical but also geopolitical.

According to the UK Ministry of Defence, this involvement of defence in relation to climate change and sustainability has a strategic approach as set out in the document published in April 2021 entitled 'Climate Change and Sustainability Strategic Approach'³⁰. It states that Defence will move forward in responding to emerging geopolitical and conflict-related threats exacerbated by climate change while adapting its own armed forces to new operational conditions and establishing strategic partnerships.

Meanwhile, the Biden Administration has also made progress in considering the impact of climate change on its security. In October, the Department of Defense (DoD) published the report 'Department of Defense Climate Risk Analysis'³¹. This is the first Pentagon report to focus on the strategic risks of climate change. It is intended as a starting point for understanding these risks to establish a way forward to integrate climate considerations into strategic, planning, budget and other key documents, as well as into engagements with allies and partners, which will be essential to train, fight and win in an increasingly complex environment. Interestingly, this report considers that not only the threats of climate change but also global efforts to address it will influence US strategic interests, relations, competition and defence priorities.

In addition to these new approaches at national level, initiatives are under way to increase cooperation between Ministries of Defence. In this regard, the 'Climate Change and Armed Forces' Initiative³² launched on 12 November 2021 at the proposal of France is

³⁰ Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/973707/20210326_Climate_Change_Sust_Strategy_v1.pdf

³¹ Department of Defense, Office of the Undersecretary for Policy (Strategy, Plans, and Capabilities). 2021.

Department of Defense Climate Risk Analysis. Report Submitted to National Security Council. Available at: <https://media.defense.gov/2021/Oct/21/2002877353/-1/-1/0/DOD-CLIMATE-RISK-ANALYSIS-FINAL.PDF>

³² <https://www.defense.gouv.fr/actualites/articles/lancement-de-l-initiative-defense-changement-climatique-et-forces-armees>

worth mentioning. This initiative, made up of 25 countries³³ including Spain, aims to create a dynamic at international level so that armies around the world are committed actors in the fight against climate change. The initiative focuses on four points:

- Anticipation to establish the risks caused by climate change,
- Adaptation to prepare armed forces for new forms of intervention and to adapt their means to extreme climatic conditions.
- Mitigation to reduce the environmental footprint at all possible levels; and
- International cooperation to ensure that climate change is not a factor of division but of coordination between states.

As for NATO — although not the first response to all climate change-related challenges³⁴ — it has in recent months intensified its focus on addressing the security implications of climate change and the consequences for individual countries' armed forces. The need to achieve climate neutrality by 2050 was discussed at the meeting held in June 2021 and an Action Plan for climate change and security was established³⁵ with targets and lines of action. With this plan, the Alliance aims to approach climate change by assessing its impact on NATO's strategic environment, adapting its capabilities, mitigation and outreach to contribute to the global response to climate change. In terms of the transatlantic relationship, NATO and the EU, Stoltenberg stated that the two organisations should collaborate in new areas such as disruptive technologies, resilience and the security implications of climate change³⁶.

Conclusions

The impact of climate change on the planet is a very complex problem that adds pressure to the current trends of globalisation, demographics, geopolitical tensions and increasing use of natural resources.

³³ Albania, Austria, Belgium, Canada, Côte d'Ivoire, Cyprus, Denmark, Estonia, Finland, France, Greece, Hungary, Ireland, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Senegal, Slovenia, Lithuania, South Korea, Spain, United States.

³⁴ https://www.nato.int/cps/en/natohq/official_texts_185174.htm

³⁵ https://www.nato.int/cps/en/natohq/official_texts_185174.htm

³⁶ https://www.nato.int/cps/en/natohq/opinions_188605.htm

Over the last few years, the traditional environmental dimension of climate change has been joined by the economic dimension — due to the need to move towards a decarbonised economy — and the security dimension. In relation to the latter dimension, the physical effects of climate change such as droughts, floods and increasing adverse events directly affect a country's populations, services and infrastructure. These physical effects of climate change are also changing the geo-strategic scenario as they contribute to aggravating those situations that give rise to conflicts, such as poverty, scarcity of natural resources or loss of livelihoods, and climate change is therefore considered a threat multiplier. On the other hand, climate change is also changing the operational and tactical landscape with significant implications for Defence and the Armed Forces.

Climate change is a global phenomenon and no region is immune to its effects. However, populations exposed to natural disasters and lacking capacity and resources are at a higher risk of instability. The inequalities, lack of basic services, corruption and weak governance and environmental degradation that characterise fragile states are the main causes that increase the risk of climate change creating a focus for social disputes that can lead to armed conflict. The extreme situation means entering into a loop of environmental degradation and conflict, which is very difficult to break.

In addition to this repercussion of the physical effects of climate change on societies, mitigation through decarbonisation also gives rise to new geopolitical risks of great magnitude, due to the restructuring of the economies of the main powers, the change of economic models in oil-exporting countries, conflicts over strategic minerals needed for clean energy or the construction of large hydroelectric projects in which disputes may arise between countries that share cross-border basins.

It is useful to identify the risk factors related to climate change that may lead to or aggravate an unstable situation. It will therefore be easier to ensure that climate change mitigation and adaptation actions are coordinated with humanitarian and development assistance and peacekeeping actions to reduce the vulnerability of populations and thus contribute to stability.

*Mar Hidalgo García**
Senior Analyst
IEEE