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# Nexus Approach to Cope with Climate Crises

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## ABSTRACT

The Nexus represents the complex interrelationships and interdependencies between systems altogether with equal perspective. It is considered a security challenge and good governance of resources that essential for sustainable development, The Nexus approach is a holistic vision of sustainability that tries to balance different development goals by managing trade-offs and exploring opportunities for synergies in light the of growing demand for resources and other key drivers. It recognizes the incremental value of the natural environment to humans. A nexus approach can increase resource efficiency and the support decoupling of economic devote elopement from the use of resources and environmental pressure. These can be done by fostering coordination and cooperation among the cross-cutting policy. Solving the challenges using the 5 Is "Institutions, information, Instrument (legal, policy, economic), Infrastructures and investments and international and regional cooperation. devote more attention for nexus approaches. It is importing t to build integration between adaptation and mitigation through co-benefits from existing sectorial plans such as "national water master plans that are coordinated with other sectors as energy, land, agriculture and environment". These synergies can be avoided negative externalities of climate change and mala-adaptation.

***Keywords:*** *nexus, sustainable development, climate change, global change.*

## 1. Introduction

The Nexus represents the complex interrelationships and interdependencies between systems altogether with equal perspective. It is considered a security challenge and good governance of resources is essential for sustainable development. In this context Nexus approach is a holistic vision of sustainability that tries to balance different development goals by managing trade-offs and exploring opportunities for synergies in light of the growing demand for resources and other key drivers. It recognizes the incremental value of the natural environment to humans. A nexus approach can increase resource efficiency and support the decoupling of economic development from the use of resources and environmental pressure. These can be done by fostering coordination and cooperation among the relevant sectors and cross-cutting policy. Solving the nexus challenges can be done by using the 5 Is tools "Institutions, information, Instrument (legal, policy, economic), Infrastructures and investments, and international and regional cooperation. Whatever, devoting more attention to nexus approaches is important to build integration between adaptation and mitigation for co-benefits from existing sectorial plans such as "national water master plans that are coordinated with other sectors such as energy, land, agriculture, and environment". These synergies can be avoided negative externalities of climate change impacts, maladaptation, and other global changes as well such as population growth and economic unitability. Furthermore, coordination between sectorial strategies can also be supported by expert advisory bodies or targeted research programs that provide expertise and recommendations on how

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synergies from nexus can be exploited and trade-offs be minimized. Moreover, raising awareness and providing opportunities for engagement in strategy development processes for public opinion, non-governmental organizations or civil society organizations often play an important role in promoting sustainable development. Thus, can strengthen the integration of the nexus approach to sectorial strategies. the coming sections present the links between nexus and global change. Discuss What are the driving and threats for nexus and more detail about the tool for Appling this concept. And finally, the lessons learned from using the nexus approach in different scale and dimension internationally, regional and national level

## 2. Nexus Definition

The Nexus Approach represents the complex interrelationships and interdependencies between systems between systems altogether with equal perspective. It is considered a security challenge and good governance of resources that essential for sustainable development. Rasul (2014), Endo et al. (2017), Howarth and Monasterolo (2017), Hussien et al. (2017), Simpson and Jewitt (2019), (zahran 2020, Jose´ Baltazar Salgueirinho et al, 2021). Good governance Represents a system model that is context-sensitive and adapted to local circumstances. Good governance represents the optimal use of resources and tools, by governments and/or companies, to increase resilience and promote sustainable development Lawford et al. (2013), Al-Saidi and Elagib (2017). Furthermore, resources security in the Long Run means avoiding a shortage of water, energy, food, and other resources, security requires the conservation of vital natural resources. Reaching a degree of resource security enables humanity to defend itself against hunger, strife, war, and wasteful resource pollution. For example, water security exists when sufficient amounts of good quality fresh water are available for human consumption (drinking and sanitation), agricultural activities and other productive sectors. Therefore, water security influences food and energy systems. But food security Exists when all people have access to sufficient, safe and nutritious food. Food security requires physical availability and economic access to food, as well as stability of the supply. It relies on both water and energy security. Meanwhile, energy security exists when all people have uninterrupted access to affordable modern energy sources. Energy security influences both food and water systems, but it is also affected by water insecurity.

Underlying FAO's Nexus approach is a holistic vision of sustainability that tries to balance different development goals by managing trade-offs and exploring opportunities for synergies in light of the growing demand for resources and other key drivers. It recognizes the incremental value of the natural environment to humans. Nexus adds relatively little to already existing integrated approaches to resources management such as integrated resources management that focus on water-related goals over others thereby counteracting the initial idea of a cross-sectoral perspective and response options. Nexus considers equally dimensions and complements for all resources management. A nexus approach can increase resource efficiency and support decoupling of economic development from use of resources and environmental pressure. These can be done by fostering coordination and cooperation among the relevant sectors and cross cutting policy (zahran, 2020). Fig (3)

## 3. Nexus Challenge and Problems

The nexus approach seeks to more coherent, synergic and cooperation toward common objectives with active and due consideration of different interests (FAO 2014a, b; Sanders and Masri 2016). However, in order to be predictable and avoid thinning, The Nexus notion needs to be well-defined and quantified (Wichelns 2017; Chirisa and Bandauko 2015) because it is still unclear for decision-makers.

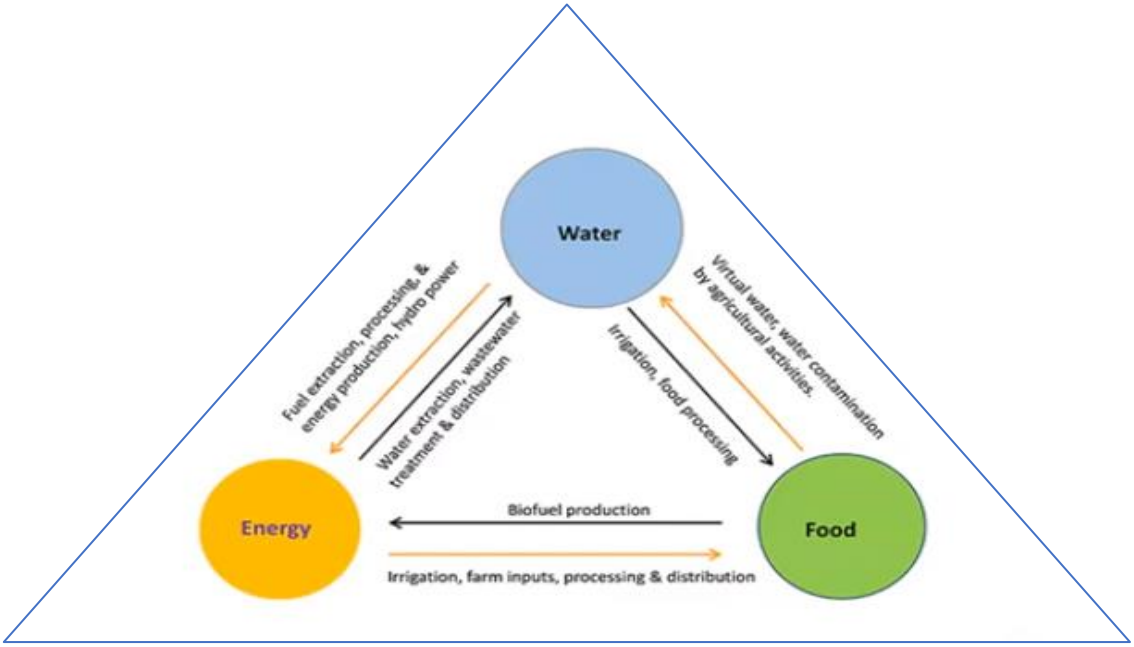


**Figure (3)** Nexus for water, Food, energy interlinked

The WEF Nexus for example addresses the complex relationships between the various water, food, and energy (WEF) frameworks, which include a security concern linked to economic development. Given this special situation, the core of the Nexus is the development of an integrated framework to examine and deal with WEF assets as connected regions for human endurance (Bieber et al. 2018; Spiegelberg et al. 2015; Bhaduri et al. 2015). The nexus perspective considers three levels of interlinkages; water, land, and energy resources as a part of the ecosystem, production of water, energy, and food depends on the same natural resources and ecosystem, and each sector depends on services from the other sectors. In this context, we can conclude that driving for nexus studies should deal with identifying the security issues and related threats to avoid mall adaptation and failure of applying the nexus approach. such as scarcity of water, energy, food, or environmental degradation. Management for each system or resource without another one may lead to negative impacts such as economic losses or an increase in the demands for such resources and their scarcity. On the other hand, the intervention in terms of global and climate change also causes stress for these resources that threatens these resources and increases the need and consumption with a direct impact on development between cross systems. To apply nexus approach successfully, such interlinked strategic plan and policy and mainstreaming the investment projects based on nexus is essential.

## 4. Nexus Assessments Tools and Process

One of the nexus processes can be followed depends on some key phases beginning with identifying stakeholder maps to formulate the challenges and problems that face resources management. They will draw and identify the nexus problems tool, model, and data needed to analyze and solve these problems. Then formulate scenarios development and analysis. These tools for scenario analysis such as conducted model runs with different techniques and innovations will help in quantifying and trade-offs between many nexus solutions. After that, the stakeholders and decision-makers can assess the result and effects of possible actions, agree on the priority of actions, and define who leads and who supports from actors. This process is shown in Figure (4)

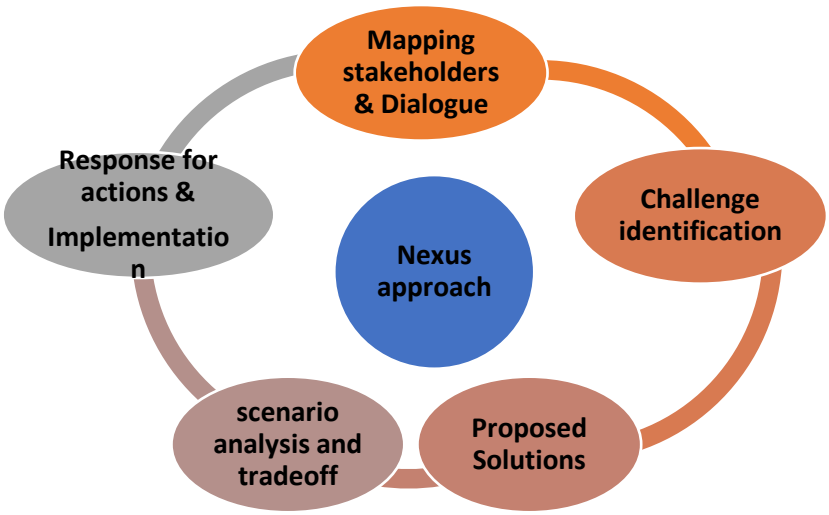


**Figure (4)** nexus process and analysis

A nexus approach can increase resource efficiency and support decoupling of economic development from use of resources and environmental pressure. But there are many measures that need to be recovered to Apply the nexus approach effectively. These measures include the "5 I s" of "Institutions, information, Instrument (legal, policy, economic), Infrastructures and investments, and international and regional cooperation. The first one "institution measure" which meanly focuses on good governance and reform to improve institutional cooperation sectorial and inter-sectors. This for example will be by; Clarifying roles and responsibilities for organizations, setting up and improving existing mechanisms for coordination across sectors, and ensuring coherence between sectorial strategies. The second "I", is information and data exchange, in terms of improved collection, accessibility, and communication of data, information, and Knowledge related resources and their dynamics. Such improvements to monitoring available resources and their quality, uses and prediction, and forecasting as well, identifying the barrier for policy implementation, and improve the knowledge to support the nexus challenges. Third "I", define and implement various Instruments and measures that are very important to address trade–offs and promote synergy in the management of natural resources and environmental protection. These could include Policies and plans for key sectors, Economic instruments; to provide incentives, and Legal instruments; such as agreements and protocols. The fourth "I" is Infrastructure and investments by planning, modifying, or modernization of existing infrastructures in addition to the use of innovation and modern techniques in design and implementation. these could be improved resource efficiency and effectiveness. taking into consideration the direct investment in multi-purpose investment projects to get maximum benefit from resources with optimum manners. The last and most important "I" is fostering international, regional, and national cooperation and collaboration that help in Define area of Common interest for regional development and optimize the use of resources and infrastructure at the regional level Jose´ Baltazar, et, al, 2021).

## 5. Climate Change and Nexus Relationship

Global climate change has a degrease effects on all human activities and resources leading direct and indirect changes such as increase in consumption and economic growth, Figure (5). These changes in climate variables (i.e. high temperature, precipitation changes, sea level rise, melting snow,) cause special and temporal hazards on natural resources and vulnerable regions such as coastal zones and islands. On other words although climate has impact on developing sectors, water is considered as a connector between those sectors and vis versa, figure (9). Climate change intensified the hydrological cycle causing flooding, drought, sea level rise, or even extremes whether which could affect on water quality, water availability and accessibility. Finally threat water security with consequently impacts on all sectors such agriculture, energy,

ecosystem and water supply. See table (1) for observed impact from climate change in water sector with their linked sectors and sustainable development goals

**Table (1)** Effects of climate change are observed through the scarcity of water

| Sector | Climate change impacts | SDG related |
|---|---|---|
| Health | Increased risk of downing an outbreak of waterborne diseases<br>Compromised quality and quantity of drinking water | 3,6 |
| Agriculture | Unhygienic flood in aquaculture -contaminating ponds<br>Los of livestock and crops from drought | 1,2,6, |
| Energy | Power outage<br>Reduced hydropower | 7,6 |
| Infrastructures | Disruption of transport services<br>Disruption and destruction of infrastructure that need water to function | 6,11,9 |
| Water supply | Damage to water supply systems<br>Shortage of water | 6,11,9,14,11,13, |
| Biodiversity | Drowning animal and vegetation<br>Increased risk to wetlands biodiversity | 6,11,12,13 |

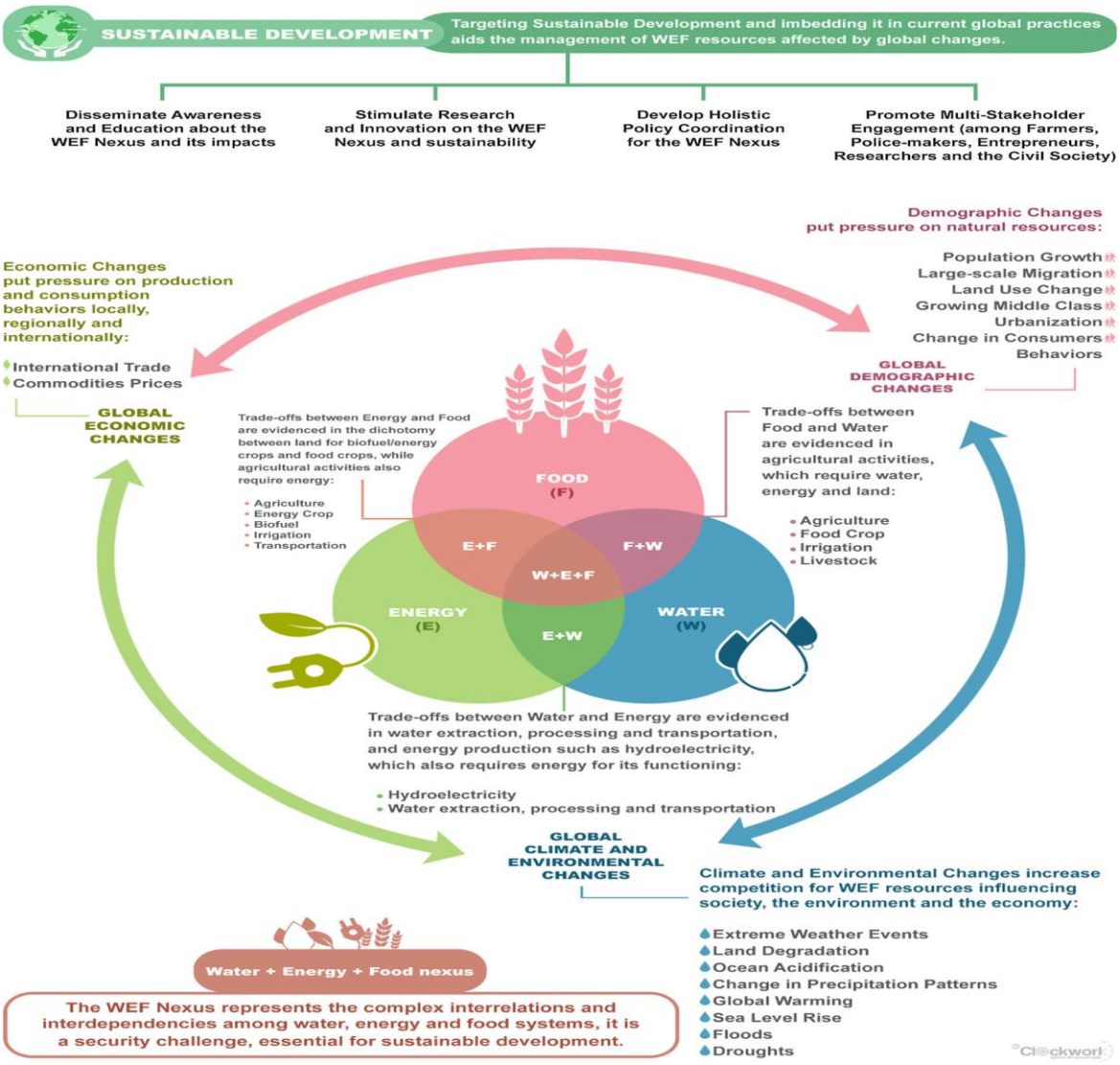


**Figure (5)** The WEF Nexus for sustainable development - (Jose´ Baltazar, et, al, 2021)

Climate change, such as extreme weather events, change in precipitation patterns, global warming, land degradation, water shortages, droughts, sea-level rise and desertification make people especially in developing countries such African countries the most vulnerable because of rely and depend on agricultural activities for subsistence and income (Damerau et al. 2016; Berchin et al. 2015; Faria et al. 2016). in developing countries, Population and economic growth, a growing middle class, rapid urbanization, rising demands for WEF resources, and the expansion of irrigation practices in agricultural production, present significant challenges in efforts to ensure WEF security, achieve the SDGs, and mitigate and adapt to the effects of global climate risks (Spiegelberg et al. 2015; Rasul 2016; Al-Saidi and Elagib 2017; Amorim et al. 2018). So, the impacts of climate change can reduce productivity, causing food, energy and water insecurity that triggers various forms of collective violence and rising prices (Faria et al. 2016) at social dimension. And then, this can lead to public health problems and famine (Smith et al. 2015), and even forces people to migrate due to extreme weather events and insecurity (Berchin et al. 2017). When it comes to the WEF Nexus, no measure can be taken without regard for the interdependency of the three sectors and how they affect climate change, since system interaction promotes greater flexibility in addressing issues such as global risks and the

mitigation of climate change (Karan et al. 2018; Simpson and Jewitt 2019). So, implementing policies that adapt to and reduce climate change while being as unrestrictive as feasible is difficult. In this context, climate change can be a positive catalyst for improved water management and water governance by changing the way of use and reuse the limited water resources. This could be conducted by interlinking between sectorial plans for other resources with integrated water resources management. The only two strategies for coping with climate change are mitigation and adaptation. Mitigation is to prevent or reduce the emissions to reach to zero balance of carbon and decrease the increase in temperature not more than 1.5 o and adaptation strategies to build our resilience to cope with adverse impacts of climate impacts and integrate with both. This integration between the two strategies could be formulated in nexus methodologies. For example, although water is needed for agricultural productivity and food security with very high demand, water also can be saved from the agriculture sector by using new methods for irrigation techniques, good practices, technologies, and innovation for smart irrigation techniques or cultivating cropping patterns with less water consumption or use new techniques for hydroponic and aquaponic cultivated. However, all these plans are considered as adaptation strategies on water demand management due to climate change in the water and agriculture sectors which will be conducted effectively with a nexus between those sectors. Furthermore, Water is important for energy production and process for cooling in addition to hydropower as renewable energy which is considered a mitigation strategy toward climate change with very low emissions. Energy also is essential for water treatment, pumping, and many water project processes in water supply that are considered adaptation strategies in case of water scarcity or shortage due to climate impacts such as physical or artificial drought. Energy is also important for all agricultural practices and the waste from agriculture could be used for producing energy in the form of biogas. Water is vital for ecosystem conservation and the natural base system which is considered a sink for carbon and then reduces the emission as a mitigation strategy. However, we are alarmingly off-track because there isn't any Political and institutional cooperation between levels, actors, and sectors, which means that decisions taken in one sector (e.g., agriculture, energy, health, often do not consider the impacts on water availability and water quality in other sectors, and that issues do not receive the necessary political attention (UN-WATER, 2021). So, these interlinked and interdependent adaptation and mitigation strategies for climate change between different sectors help in achieving the seventeen sustainable development goals and fulfill the requirement for international commitments such as UNFCCC for climate change and Sunday framework for disaster management. And then we can conclude that all mitigation and adaptation strategies for climate change depend on the nexus between the development sector and natural resources

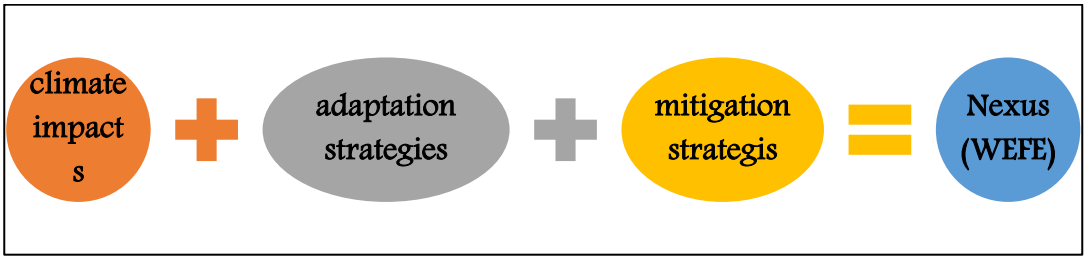


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Figure (6) relation between climate change and nexus

## 6. Nexus for Sustainable Development

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own need (UNGA,1987). The Sustainable Development Goals (SDGs) or Global Goals are a collection of **17 interlinked** global goals designed to be a "blueprint to achieve a better and more sustainable future for all, figure (7).


**Figure (7)** sustainable development Goals, SDGs

However, IPCC WGII AR5 mentioned in Most projected climate change risk for 21 the century that SDGs are all linked with water and effects on achieving SDGs, Sunday framework or UNFCCC commitments figure (8) and table (1). Such linked as;

- Increase poverty and health impacts due to lack of access to safe drinking water
- Loss of rural livelihood and income due to insufficient access to irrigation water
- Reduced agriculture productivity and loss of terrestrial and inland water ecosystem
- Reduce biodiversity and ecosystem good and services they provide for livelihoods
- Increased likelihood of extremes such as drought and flood (IPCC WGII AR5)

The World Bank estimated that water scarcity, excerpted by climate change could cost some regions up to 6% of their GDP by 2050. As a result of a delay in conducting the interconnections between SDG 6 and other SDGs in terms of safe water and services, wastewater management for health and environment, rather that recycling for agriculture and energy as shown in Figure (8), The World Bank estimated that water scarcity, excerpted by climate change could cost some regions up to 6% of their GDP by 2050.

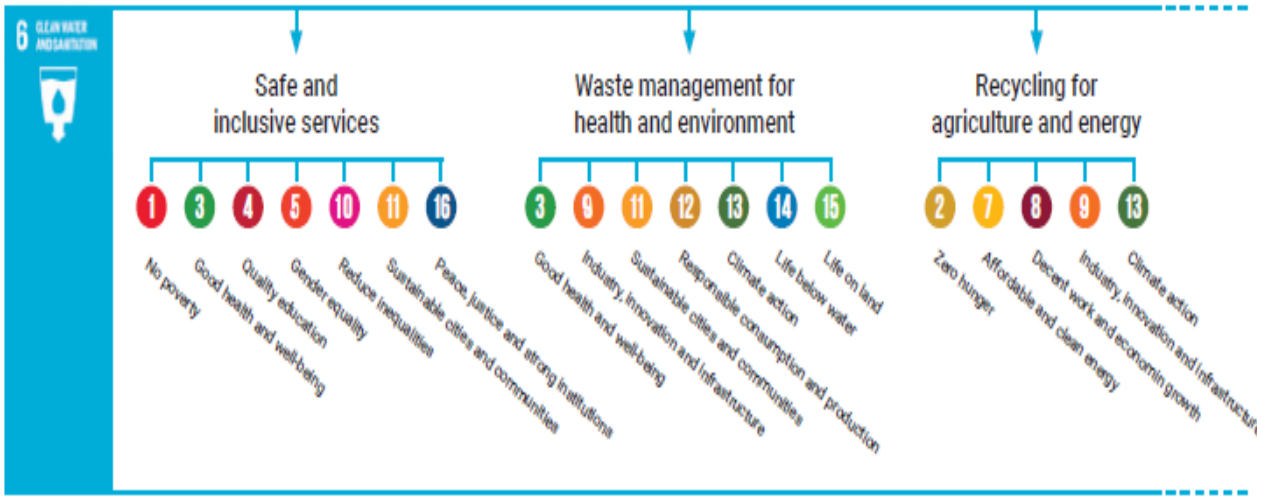

**Figure (8)** Connecting the dots, **Developed by the Stockholm Environment Institute for Sweden (2018)**

Furthermore, as water is connected between developing sectors climate change has a negative and severe impact on all those sectors. Therefore, water management plans linked with other sectorial policies and plans can achieve the target and indicators for all international commitments "disaster risk reduction as in Sendai frameworks, climate change in parties agreement and sustainable development goal for 2030 agenda, figure (9). In accordance counteract climate change and prepare for its effects, new methods and innovative technologies are crucial tools (Hellegers et al. 2008). Examples include increasing crop productivity, maximizing the effectiveness of water use and treatment, raising energy efficiency, and maximizing distribution through local production. They help local development (Martinez-Hernandez et al. 2017), enable the monitoring of progress (Sanders and Masri 2016), and provide vital information on the WEF Nexus and its intricate interrelations. However, good governance has the power to influence financial measures, legal and regulatory measures to regulate the exploitation of natural resources, and stimulate research and innovation that support the effectiveness of sustainable development and effective adaptation to climate change (Berchin et al. 2018) that support the effectiveness of nexus. Global collaboration, meantime, is a crucial instrument for overcoming the institutional and financial barriers that prevent sustainable development, which includes the security of food, water, and energy (Hanjra and Qureshi 2010; Engstro m, et al. 2018).

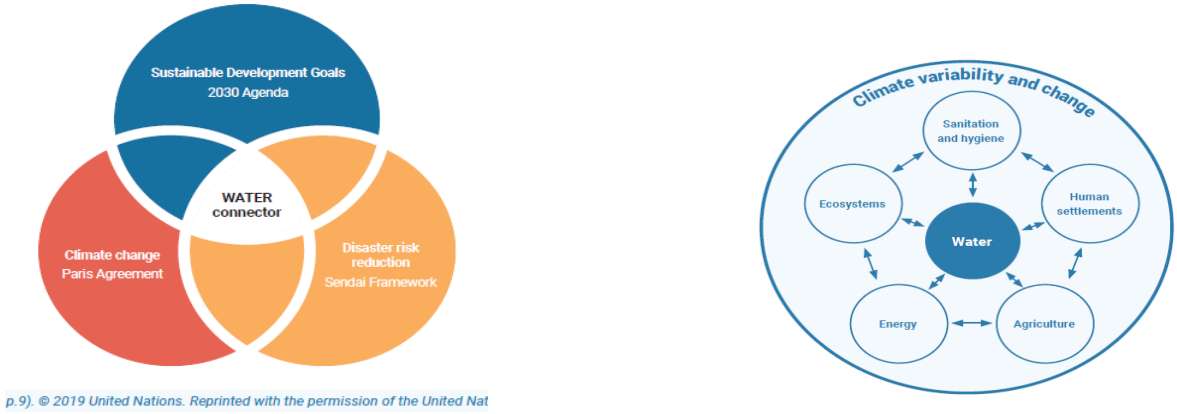


Figure (9) Water as a connector among the global commitment adapted, 2015 at the left and Interaction between water and other socio-economic sectors affected by climate sectors at right, UN, water and climate 2020. The idea is to apply the knowledge obtained through research to the production sector, aimed at improving the sustainability of the WEF Nexus. To achieve this, comprehensive public policies need to be created based on the interconnectivity of the Nexus approach to sustainability.

## 7. Climate Crises in Africa

Africa produces a little percentage of the world's greenhouse gas emissions, "the Per capita emissions of carbon dioxide in Africa in 2021 were 1.04 metric tons per person, compared with the global average of 4.69 metric tons per person" although it suffers disproportionately from climate change. A recent analysis from the World Meteorological Organization (WMO) claims that this is exacerbating the prospect of conflict over diminishing resources, compromising food security, ecosystems, and economies, as well as causing migration and displacement. The State of the Climate in Africa 2022 report shows that the rate of temperature increases in Africa "(+0.3 °C/decade during the 1991–2022 period)", has accelerated in recent decades, with weather- and climate-related hazards becoming more severe. Figure (1) And yet financing for climate adaptation is only a drop in the ocean of what is needed

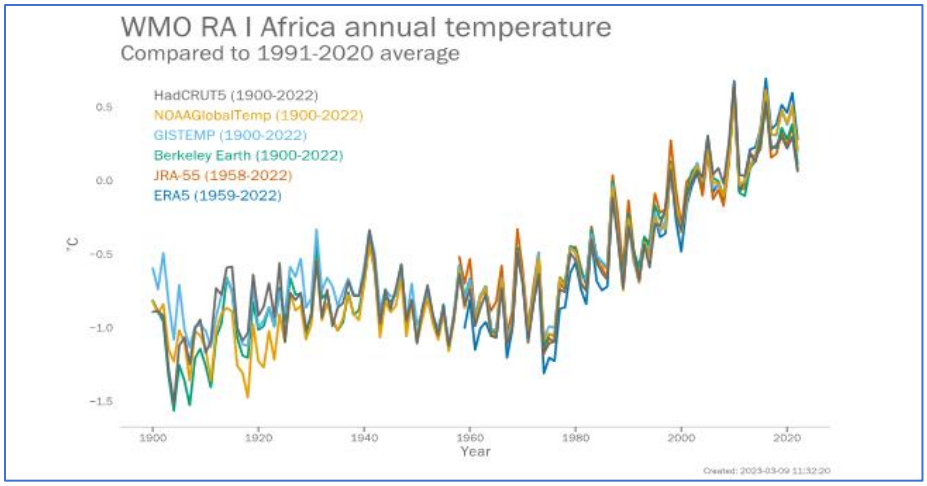


**Figure (1)** Temperature difference in °C with respect to the 1991–2020 climatological period for Africa (WMO Regional Association I) from 1900 to 2022, based on six datasets

The ability of Africa to deal with the negative effects of climate change is the lowest. Meanwhile, Increasing numbers of people are at danger as a result of heatwaves, torrential rain, flooding, tropical cyclones, and protracted droughts, which are having disastrous effects on communities and economies. The consequences of climate change are anticipated to be felt more severely in Africa due to its high exposure, fragility, and inadequate potential for adaptation. Risks related to climate change are considerable for people's health, peace, prosperity, infrastructure, and other economic activities across many sectors in Africa. In this sense, agriculture—which employs more than 55% of the labor force in Africa—is the foundation of national economies and means of subsistence. However, due to climate change, its agricultural production increase has decreased by 34% since 1961. By 2025, it is anticipated that African nations' annual food imports would rise by a factor of three, from US$ 35 billion to US$ 110 billion.

The extent of loss and damage, and consequently the costs spent, will rely on a variety of variables, including the scope of global mitigation efforts and the amount of money invested locally in adaptation. By 2080, "residual damages" expenditures equal to 3% of Africa's projected gross domestic product might be incurred yearly in a world warmed by 4 °C with substantial regional adaptation. According to the African Climate Policy Centre of the UNECA, the loss and damage costs associated with climate change in Africa are anticipated to range between US$ 290 billion and US$ 440 billion, depending on the rate of warming. Figure (2).

Conflicts over scarce productive land, water, and pastures may be exacerbated by climate change and the depletion of natural resources.

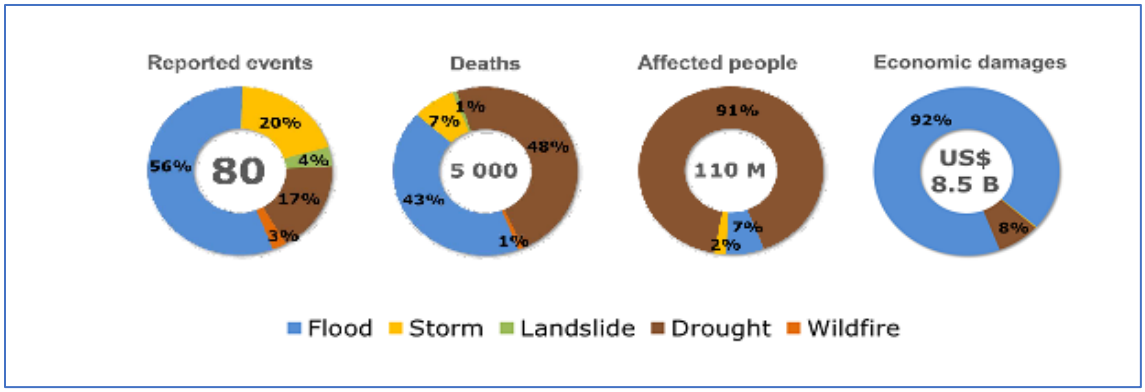

**Figure (2)** Weather-, climate- and water-related disasters in Africa in 2022. Source: Data as of June 2023 from EM-DAT, https://www.emdat.be

Other climate variable also has a great impact at many regions in the content such **Rainfall:** The Horn of Africa faced its worst drought in 40 years, with Ethiopia, Kenya and Somalia particularly hard hit. The "triple-dip" La Niña was a substantial contributor. Five consecutive failed rainfall seasons reduced agricultural productivity and food security. In Somalia, almost 1.2 million people became internally displaced by the catastrophic impacts of drought on pastoral and farming livelihoods and hunger during the year. A further 512 000 internal displacements associated with drought were recorded in Ethiopia. Many parts of the Sahel experienced significant flooding during the monsoon season, with Nigeria, Niger, Chad and the southern half of Sudan particularly affected. The **Tropical Cyclones:** The South Indian Ocean experienced an active tropical cyclone season despite an unusually late start. The Southern Africa region was hit by a series of tropical cyclones and tropical storms in the first months of 2022, leading to flooding and population displacement. There was little time for recovery between shocks in nations like Madagascar. **Sea-level rise:** The rate of coastal sea-level rise in Africa is similar to the global mean value of 3.4 mm/year. It is, however, slightly higher than the global mean along the Red Sea (3.7 mm/year) and along the western Indian Ocean (3.6 mm/year). In this context, more than 50 African countries have now submitted their Nationally Determined Contributions (NDCs). Agriculture and food security, water, disaster risk reduction, and health are the top priorities for adaptation. Implementing Africa's NDCs will require up to US$ 2.8 trillion between 2020 and 2030. The African Development Bank (AfDB) has doubled its climate finance to US$ 25 billion by 2025 and devoted 67% of its climate finance to adaptation, in addition to its effort to raise up to US$ 13 billion for its Africa Development Fund. https://public.wmo.int/en/media/press-release/africa-suffers-disproportionately-from-climate-change

## 8. Nexus Application "Cases in Africa"

The WEF Nexus is seen in the context of climate change from a different perspective in the research conducted in Africa. It also emphasizes the high costs of resources and inputs that put WEF security at risk at the household level and with reference to production systems, in addition to the scarcity of resources. Improved WEF security in the area may be achieved while enhancing sustainable development and lowering householder vulnerabilities through improved management of natural resources, strong governance, and grassroots innovations. Africa faces many problems related, the poor infrastructure, inadequate institutional and administrative capability, and declining human development rate since the 1990s. Africa depends on agricultural output for export earnings as well as for domestic consumption. Nevertheless, the threat to agriculture is posed by desertification and the intensity of global competition. International assistance and strategies for development that priorities WEF security are required for the continent (Davidson et al. 2003).

***Sub-Saharan Africa,*** the implications of climate change on water management, food production, and energy production in sub-Saharan Africa were examined by Davidson et al. in 2003. The research emphasizes that Africa is rich in natural resources, including energy and mineral resources, as well as other natural resources, in the context of the African scenario at the beginning of the millennium. Their exploitation, however, is either minimal or illogical, and the goods are frequently transported to areas outside of the continent.

***Nile Basin***, Rapid population development, inefficient resource use, climate change, and ongoing disputes between bordering nations with sizable productive riparian zones are all contributing to the stress on the Nile basin. The Blue Nile River, one of the primary tributaries of the Nile basin, generates 60% of the total yearly flow (Allam and Leather 2019). In order to efficiently manage land and water resources for irrigated agriculture and hydroelectric power generation, maximizing overall benefits, Allam and Eltahir (2019) examined the WEF Nexus in the Blue Nile River basin. The study's model illustrates a sizable potential for

the growth of rain-fed agriculture, which might eventually cover up to half of the basin's surface and enhance the soil. The increase of potential rain-fed agriculture in the watershed and water savings for hydropower generation are trade-offs. Countries in the area would have the chance to work together through this trade-off to engage in effective agricultural growth while splitting expenses and gains (Allam and Eltahir 2019). These are a few instances of regional and national efforts that need to be scaled up. Investigating the virtual water trade, transboundary water resource management, and resource-use improvement approaches and technology are further possible endeavors to address the issues raised by the WEF Nexus. In order to promote long-term policies and strategies aiming at enhancing food security and sustainability throughout the whole African Continent, the Nexus method is crucial. Abuzied, K. (2021) found that for Blue Nile during 1911 to 2015 the droughts could happen in isolated incidents or in a prolonged period having similar effects but with different possible responses depending on the resilience and preparedness of each country for each case. Fig (10)

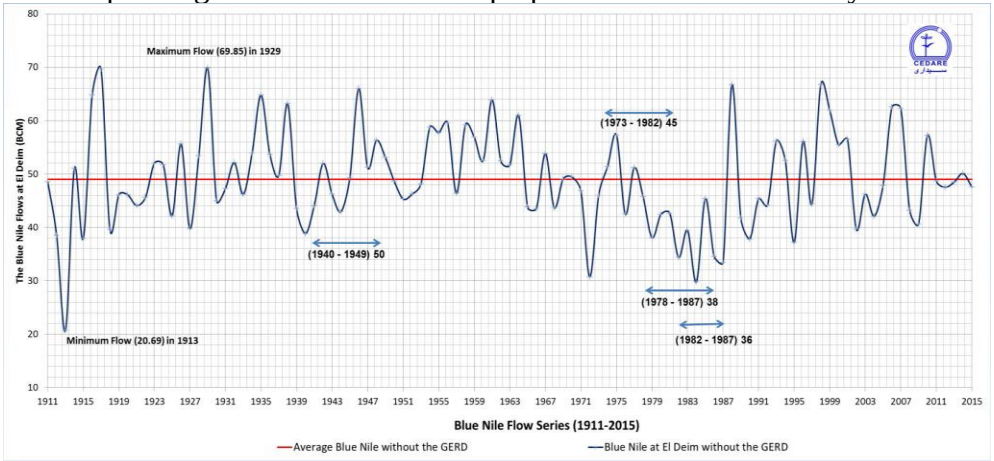


**Figure (10)** Historical Blue Nile Flows (AbuZeid, K. (2017))

He mentioned that, although mitigation measures against drought may be available for some of the Blue Nile countries, however water demand has increased and upstream pressures due to uncoordinated activities and unilateral decisions upstream the transboundary Blue Nile had exacerbated the potential impacts of natural drought risks for downstream countries. (AbuZeid, K. (2021). Meanwhile reaching an agreement on the filling and operation of the GERD could provide for a positive water-food-energy nexus solution. without an agreement the case could lead to a water-food-energy nexus conflict instead. GERD not only used for hydropower, it could be exacerbated drought impacts during normal drought periods due to the accumulative evaporation and seepage losses from the huge potential 74 BCM reservoir behind the dam, and due to the uncertainties associated with the filling and operation rules of the dam, and the uncertainties around other potential uses of the GERD Blue Nile waters by Ethiopia. (AbuZeid, K. (2021)). Whatever Reducing the storage capacity can reduce the drought risk on downstream countries due to the reduction of evaporation and seepage losses, Information technology, information systems, rainfall forecasting, climate and hydrological modeling, multi-objective planning with the water-energy-food nexus approach can play an important role in the efficient management and mitigation of drought risks and its hydrological impacts in the Blue Nile.

***Four African cities, including Bulawayo (Zimbabwe), Cape Town (South Africa), Dar es-Salam (Tanzania), and Cairo (Egypt),*** have been notably impacted by the intensification of climate change owing to heat islands and droughts in urban areas. Due to the compromised water supply needed for hydroelectricity generation, these consequences pose a danger to energy security (Chirisa and Bandauko 2015). African cities' water shortages have a significant impact on food production as well, especially urban agriculture. The WEF Nexus trade-offs are exacerbated by the inadequate institutional ability and budget limitations faced by local governments in these places, as well as the limited technical competence to address climate change. As a result,

the poor are burdened by increased food and energy prices as well as water rationing (Chirisa and Bandauko 2015).

## 9. National Efforts Support Nexus

For instance, the National Council for Climate Change was founded by the Egyptian government in May 2019 in order to combat climate change and develop pertinent public policies. They formulate a broad plan of action to address climate change. The National Council for Climate Change works with all sectors to guarantee that the climate change plan is followed.

## 10. Conclusions

The Nexus approach provides a systemic multisector perspective to promote a sustainable development agenda, disaster risk reduction framework for sendai, united nation framework for climate changes agreement and meet the challenges imposed by global environmental changes. Therefore, effective efforts towered applying the Nexus is necessary to achieve all United Nations commitments and the requirements for all nations. The complexity of the challenges requires active stakeholder engagement between all beneficiaries; governmental and non-government. This mean an integrated multi-sectoral, multi-scale and multi-disciplinary approach is required as well. the nexus framework can be applied at different scale: sub-national, national and regional. The modeling nexus; although it is challenge and data intensive, it brings valuable insights to inform the decision-making process. This could be support by global, regional and even national and sub-national cooperation, good go governance applying, innovative techniques, and mobilizing the resources; natural, instituting, financial, legal, last and not least is regarding to stimulate the scientific researches.

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