**Historical Timeline tool**

Jonglei, South Sudan

April/May 2023

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# Introduction

Jonglei state in South Sudan has faced recurring climate disasters, conflict events, and displacements over the past three decades, disrupting food systems and seed security[[1]](#footnote-1) [[2]](#footnote-2). The predominantly pastoralist and agrarian population is highly vulnerable to climatic stresses and violence[[3]](#footnote-3). This report analyzes a dataset compiled from a historical timeline exercise documenting major hazards in Jonglei annually from 1990-2022, and their impacts on communities.

The analysis focuses on threats to seed security and plant genetic resources for food and agriculture. Recurrent hazards, including floods and conflicts, have eroded crop diversity and disrupted local seed systems[[4]](#footnote-4). Loss of traditional climate-resilient varieties and knowledge is compounded by dependence on emergency seed aid. Combined with rainfall variability, conflict-related displacements, and pest outbreaks, these trends severely undermine resilience. Key findings show climatic and conflict shocks occurred in over half the years examined. The impacts include loss of lives and livelihood assets, hunger, and displacement. Climate hazards caused repeated crop losses and damage to granaries storing seeds[[5]](#footnote-5). Displacement from conflict zones also cut off seed access.

While aid organizations have provided lifesaving relief, the recurring crises point to a lack of durable solutions. The loss of crop diversity, indigenous knowledge, and control over seed reserves has increased vulnerability to future shocks.

By examining hazards over three decades through a seed security lens, the report highlights the need for conservation of plant genetic resources, strengthening community seed systems, and integrated approaches addressing climate risks, conflicts, and food security. The insights can inform policies and investments to build resilience of vulnerable groups to withstand interconnected social, economic, and environmental stresses

# Methodology

The University of Juba and Wageningen Centre for Development Innovation implemented the data collection under the Food and Nutrition Security - Resilient Livelihoods for South Sudan (FNS-REPRO) program.

The aim was to understand the major hazards, shocks and stressors faced by farming communities in Jonglei state over the past 30 years, and their impacts on livelihoods, crop diversity and seed systems. The data was collected through focus group discussions with approximately 20 farmers in each village. The farmers represented a mixed group of older and younger, male and female participants to get diverse experiences. To facilitate faster digitization of the data, tablets were used to enter the data directly in the field.

* In each discussion, the facilitator first drew a timeline matrix on a flipchart with columns for the year, hazards, livelihood impacts, and impacts on crops and seed systems
* The facilitator then guided the participants through key questions to fill the matrix, asking them to recall major events year-wise going back 30 years - what hazards occurred, how they affected livelihoods, and how they impacted crop diversity and seed availability.
* Participants gave examples to populate the matrix, while the facilitator recorded these in the matrix on the flipchart. Colored marker pens highlighted key hazards and impacts in the final matrix.
* After completing the matrix, participants synthesized the timeline either as a group discussion or through facilitator analysis across villages. The discussions and the data were directly being fed into the android tablets, which were then synced to a server (Kobo Toolbox) for data analysis. The result was a consolidated timeline documenting major hazards faced by Jonglei's farming communities and their repercussions over 30 years.

# Results

## Hazards and their distribution

|  |  |  |
| --- | --- | --- |
| **Hazard Type** | Hazard Events | Frequency |
| Climatic | Drought, Floods, Dry spell, Rains, Earthquake | 18 |
| Conflict | Inter-communal conflicts, Govt-IO conflict, Civil war | 22 |
| Disease/Pest | Livestock diseases, Crop pests | 3 |
| Other | NGO evacuations, Introduction of new varieties, | 2 |

The most frequently mentioned hazards were conflict-related (22 mentions), followed by climate-related hazards like droughts and floods (18 mentions). Inter-communal conflicts, especially cattle raids between Nuer, Murle and Dinka communities were the most prevalent conflict hazards over the years. Climatic hazards like droughts and floods were also very common. There were a few mentions of disease/pest hazards (3) and other types of hazards (2) like NGO evacuations.

This indicates that conflict between communities has been the most prevalent and consistent hazard in the region based on the dataset, with climatic events also representing a major hazard category especially in recent decades. Disease outbreaks and other hazards have been less widespread or impactful based on their limited mentions in the timeline summary. Look into Annexe 1 and 2 for detailed data.

Jonglei has been one of the most conflict-afflicted states in South Sudan, suffering from frequent raids and violence between ethnic groups like the Nuer, Dinka, and Murle. This is reflected in the timeline's high frequency of inter-communal conflict events (22 mentions). News reports corroborate massive raids in 2009 by Lou Nuer on Murle that killed over 400 people[[6]](#footnote-6) . Again in 2011-12, thousands were displaced by inter-ethnic violence between these communities[[7]](#footnote-7).

Climatic hazards like droughts and floods have also repeatedly struck Jonglei, often amplifying tensions and conflicts. The timeline documents regular droughts and 18 climatic events, consistent with sources listing Jonglei among the worst hit by droughts in the 1980s and 1990s[[8]](#footnote-8) that caused frequent food insecurity. Devastating floods occurred in 2006, 2007, 2019-20 impacting livelihoods[[9]](#footnote-9) [[10]](#footnote-10).

Disease outbreaks have also impacted Jonglei's predominantly pastoralist population. Reports mention livestock disease outbreaks like Rift Valley fever in the 2000s coinciding with the timeline[[11]](#footnote-11). The conflict between the Sudan People's Liberation Army (SPLA) and Sudanese state from 1983-2005, until South Sudan gained independence, is also documented. Jonglei saw violence between rebel leader George Athor's forces and the SPLA during the timeline's period[[12]](#footnote-12). Aid organizations like WFP have provided vital relief in Jonglei, aligned with the timeline's mentions of aid distributions, especially during climatic disasters and conflict. However, violence has also frequently disrupted humanitarian work, like incidents in 2013-14 of aid looting[[13]](#footnote-13).

Overall, the timeline accurately captures Jonglei's vulnerability to climatic, conflict, and disease hazards over recent decades, and the unrelenting food insecurity and displacement crises facing its communities even today. It provides an insightful longitudinal overview of the complex emergency contexts that have characterized the state's history till now. Integrating it with additional sources helps validate and add nuance to the timeline.

## Impacts of Hazards

The recurring climatic, conflict, and disease hazards have severely disrupted the lives and livelihoods of agro-pastoralist communities across Jonglei state over the past three decades. The frequent droughts, floods, violence, and pest attacks have led to loss of human lives, crops, livestock assets, and homes. They have perpetuated hunger, poverty, and displacement crises. The constant need to rebuild after disasters has trapped families in cycles of food deprivation. Coping strategies like reducing meals and selling assets have increased malnutrition. Societal relationships have frayed as groups fight over scarce resources. Years of conflict have also traumatized community trust and cohesion. Agriculturally, recurrent crop losses due to climate extremes have caused farmers to shift to low-risk, low-yield varieties rather than diverse climate-resilient heirlooms. Lack of inputs, credit and markets add to the challenges. The hazards have collectively weakened the productive base, increased aid dependence, and hindered Jonglei's progress. Targeted policy and civil society efforts are essential to strengthen resilience.

Here is the summarized table with **climate hazards**, their frequency and main impacts based on the timeline data:

|  |  |  |
| --- | --- | --- |
| Climate Hazard | Years it happened | Main Impacts |
| Drought | 11 years | Increase in hunger and food insecurity, livestock losses, displacement |
| Floods | 11 years | Destruction of crops, displacement, hunger and food insecurity |
| High temperatures | 11 years | Increase in hunger and food insecurity, livestock losses |
| Low rainfall | 2 years | Hunger and food insecurity |
| Delayed rainfall | 4 years | Hunger and food insecurity |
| Soil nutrient loss | 2 years | Crop losses |
| Dry spell | 2 years | Crop losses |
| Earthquake | 1 year | Displacement, hunger |

The major climate hazards were drought, floods, and high temperatures, each occurring in 11 of the 33 years. The key impacts were increased hunger, food insecurity, loss of livelihoods assets, and displacement of communities. Drought specifically also caused major livestock losses, while floods resulted in destruction of crops. The data shows the dependence of Jonglei's population on climate-sensitive livestock rearing and farming, and their vulnerability to climatic stresses.

Here is a summary of the impacts of **climate hazards** on different aspects of life in Jonglei state:

|  |  |  |
| --- | --- | --- |
| Aspect of life | Impacts of climate hazards | Frequency of mention |
| Food security and nutrition | Increased hunger, malnutrition | 11 |
| Livelihoods and income | Livestock losses, destruction of crops | 9 |
| Forced displacement | Abandonment of villages and livestock, becoming refugees | 7 |
| Health and sanitation | Disease outbreaks due to lack of clean water | 3 |
| Education | Disruption of schooling due to displacement | 2 |
| Social cohesion | Increased resource conflicts between communities | 2 |

The recurrent climate shocks like droughts and floods have severely disrupted food security, with increased hunger and malnutrition mentioned as an impact in 11 of the 18 climatic hazard years. Livelihoods dependent on livestock rearing and crop farming have also been repeatedly devastated, with livestock and crop losses cited in 9 of 18 years. This has eroded incomes and forced destitution. Mass displacement was also a frequent impact, with communities abandoning their homes, lands and livestock in at least 7 of the climatic hazard years. Children's education got disrupted when schools were destroyed or they migrated. Disease outbreaks also followed climate disasters as sanitation worsened. The lack of clean drinking water during 1991 drought caused a cholera outbreak for example. As resources became scarce, conflicts flared up between communities competing for limited water, pasture and cattle. Climate hazards strained social cohesion.

Overall, the data highlights how almost every aspect of community life in Jonglei has been altered by frequent climate disasters. The lack of resilience or ability to absorb shocks has perpetuated deep poverty and vulnerability.

Here is a summary table of the major **conflict hazards in Jonglei state** from the timeline, their frequency, and main impacts:

|  |  |  |
| --- | --- | --- |
| Conflict Hazard | Years it happened | Main Impacts |
| Inter-communal conflicts | 22 years | Loss of human lives, livestock losses, displacement, hunger, loss of assets |
| Conflict: Govt-IO | 4 years | Displacement, hunger, loss of assets |
| Civil war | 2 years | Displacement, hunger |

The most prevalent conflict hazards were inter-communal conflicts, occurring in 22 of the 33 years covered by the timeline. These resulted in major loss of human lives, livestock, livelihoods, and widespread displacement and hunger crises due to frequent raids between ethnic groups. The conflict between government and opposition groups occurred in 4 years, also displacing communities and increasing hunger. The civil war between SPLA and Sudan occurred in the early 1990s, also forcing displacement and food insecurity. The data highlights the massive toll on lives, livelihoods and development from persistent inter-communal violence and instability in Jonglei state over decades. Lasting peacebuilding efforts are critical to address these threats.

Here is a summary of the impacts of **conflict-related hazards** on different aspects of life in Jonglei state:

|  |  |  |
| --- | --- | --- |
| Aspect of life | Impacts of conflict hazards | Frequency of mention |
| Physical security | Loss of human lives, injuries | 11 |
| Food security and nutrition | Increased hunger and malnutrition | 8 |
| Livelihoods and income | Loss of livestock and assets | 7 |
| Forced displacement | Abandonment of homes and villages | 6 |
| Health and sanitation | Lack of access to medical care | 3 |
| Education | Disruption of schooling due to displacement | 2 |
| Social cohesion | Breakdown of community relations and trust | 2 |

The most direct impact of the frequent inter-communal raids and violence has been the enormous loss of human lives and injuries. Casualties were mentioned in 11 of the 22 conflict years.

The raids also often resulted in loss of cattle and livestock, which are a key source of nutrition and income for Jonglei's pastoralist communities. This caused severe hunger and malnutrition, referenced in 8 of the 22 years. Thousands were also forced to flee their homes and villages to escape from the violence, leading to internal and external displacement in at least 6 of the years. Health services got disrupted during the conflict years, reducing access to medicines and care. Schools also closed frequently when teachers and students migrated to escape the violence. The long history of attacks and counter-attacks between the Nuer, Murle and Dinka groups has also broken community relations and trust, straining social cohesion.

The timeline data demonstrates the far-reaching human costs of persistent conflict and insecurity in Jonglei state, which will require long-term reconciliation and peacebuilding efforts to address.

Here is a summary of the impacts of **disease/pest hazards** in Jonglei state:

|  |  |  |
| --- | --- | --- |
| Aspect of life | Impacts of disease/pest hazards | Frequency of mention |
| Health and sanitation | Outbreak of cholera causing loss of lives | 1 |
| Food security and nutrition | Loss of livestock and crops causing hunger | 2 |
| Livelihoods and income | Loss of livestock assets from diseases | 2 |
| Social cohesion | Increased community tensions due to livestock diseases | 1 |

While disease and pest impacts were less frequently mentioned in the timeline data, a few key effects emerge:

* The cholera outbreak in 2000 resulted in loss of human lives and widespread sickness from lack of clean drinking water and sanitation.
* Livestock diseases like anthrax and Rift Valley Fever caused loss of cattle and goats, which are valuable assets for pastoral families. This impacted nutrition and incomes.
* Crop-damaging pests like the fall armyworm infestation since 2016 have reduced crop yields and availability of grain.

When livestock fall sick, tensions between communities can worsen if diseases are thought to be deliberately spread, lowering social cohesion.

Overall, the limited mentions of pest impacts underestimates their effects on Jonglei's population. Historical sources show episodic disease and pest cases over the decades have claimed lives, damaged food production and livelihoods. Their prevention and control is an important need.

There were some key "**other**" major impacts of hazards mentioned in the Jonglei timeline dataset listed below

* *Loss of human lives* - The timeline notes specific incidents like children and women being killed during cattle raids and conflict events. For instance in 2009, over 400 Murle civilians were killed during an attack by Lou Nuer groups.
* *Abduction of children and women* - Child abduction is called out as a major issue during Murle-Nuer cattle raids in multiple years. Women were also targeted in attacks. This has traumatic social impacts.
* *Loss of livestock* - Cattle and goat raids frequently resulted in loss of livestock assets critical for pastoral livelihoods. Migratory birds and monkeys spreading livestock diseases also caused periodic livestock losses.
* *Burning of tukuls* - During violent conflicts like in 1997 when Sudanese forces attacked, entire houses and villages were burnt down displacing communities.
* *Post-harvest crop losses* - Inadequate storage facilities led to crop losses even when harvests were successful, such as in 2016 when crops spoiled due to lack of storage after floods.
* *Migration as refugees* - Many displaced people fled Jonglei state entirely during the worst conflict and climate disaster years, migrating as refugees to neighboring countries like Ethiopia and Kenya.
* *Reliance on wild foods and crisis coping* - The food insecurity and loss of assets forced increased dependence on fishing, gathering wild foods and crisis strategies like exchanging livestock for grains.

The examples show the broad human costs and damage to livelihoods, food security, health, social fabric and community infrastructure caused by the recurring hazards faced by Jonglei state over decades. It underscores the need for long-term investment in building systemic resilience.

## Impacts on Loss on Crop Diversity and disruption of seed systems

The recurrent climate hazards like droughts, floods, and dry spells were most frequently reported to reduce crop yields (7 years) and cause loss of local crop varieties (6 years). Farmers became more dependent on external sources for seeds in the aftermath. However, in a couple years new varieties were also introduced during climate crises. Other impacts like nutrient leaching were also mentioned.

Conflict-related violence directly led to loss of varieties in one year, and reduced yields in another year.

Crop pests and livestock diseases also contributed to crop variety loss and lowered yields when farms were damaged.

Overall, the timeline data reveals climate hazards posed the biggest threat to agrobiodiversity and food production in Jonglei, by frequently lowering yields and eroding local crop diversity due to repeated droughts, floods, and erratic rains. This increased reliance on food aid. Conflict and pests exacerbated these impacts. The loss of crop diversity also lowers climate resilience. Greater efforts are needed to conserve and sustainably use Jonglei's agrobiodiversity.

We summarize the impacts of different hazards on crop diversity and seed systems in Jonglei state based on the timeline data:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Hazard Type | Reduced crop yield | Loss of varieties | Increased seed dependency | New variety introduced | Other impact |
| Climate hazards | 7 | 6 | 1 | 1 | 2 |
| Conflict hazards | 1 | 1 | 0 | 0 | 0 |
| Pests/diseases | 1 | 1 | 0 | 0 | 0 |
| Other hazards | 0 | 0 | 0 | 0 | 0 |

There were certain specific impacts that came up during the discussions, on crop diversity and seed systems mentioned in the timeline data for Jonglei state:

* Loss of specific traditional varieties of sorghum, maize, groundnuts, sesame and cowpeas during droughts, floods and conflicts. For example, the 'Matiriti' sorghum variety introduced during a drought replaced local varieties like 'Lith' and 'Beer'.
* Damage to household granaries storing seeds during raids, causing seed losses. During a Nuer attack in 1997, Murle granaries were burnt down.
* Displacement of communities during conflicts also disrupted access to seeds. In 2013-14 when violence peaked, seeds distributed could not be planted as people migrated.
* Reliance on food aid increased after climate disasters, with reports of seeds like cowpeas being provided during droughts by FAO and NGOs. This likely introduced new varieties.
* New varieties were also deliberately introduced during some crises by aid groups. For instance, fast-maturing maize varieties were given to flood-affected farmers in 2020.
* Birds and other pests like the desert locust and fall armyworm caused additional crop losses and seed availability issues during pest outbreak years.

The specific examples highlight the major attrition in crop diversity and disruption of local seed systems from the recurring hazards faced by Jonglei communities. Loss of treasured local varieties adapted to the agroclimatic conditions has likely made the food system more vulnerable. The narrative mentions of seed aid dependence also underscores the need for strengthening community resilience to sustain their own seed reserves.

The recurring climate and conflict hazards have caused severe attrition of crop diversity and disruption of local seed systems in Jonglei as documented in the timeline data. Traditional climate-resilient crop varieties suited to Jonglei's agro-ecology have been repeatedly lost during droughts, floods and displacements. For example, indigenous sorghum types like 'Lith' and 'Beer' and cowpea variety 'Mateleke Red Beauty' disappeared because of droughts and conflicts. This genetic erosion undermines food security. Lower crop diversity leads to higher vulnerability if certain varieties fail during extreme weather. Lack of diverse diets also causes malnutrition. Loss of heirloom seeds adapted over generations means less community control over seed reserves. Increasing dependence on external sources for seeds, like aid agencies, was visible during crises. But the seeds given were sometimes unsuitable or arrived too late. Reviving and conserving Jonglei's crop diversity is essential for strengthening resilience. Community seed banks help preserve local varieties. Participatory variety selection can identify stress-tolerant, nutritious varieties for promotion.

Agro-advisories based on seasonal forecasts and better storage facilities would enable farmers to plan ahead and save quality seeds despite climate variations. Engaging youth in seed entrepreneurship provides income opportunities. Integrated approaches that sustain crop diversity while building climate resilience and addressing the root causes of conflict are key for lasting food and seed security in Jonglei.

## Impact of the humanitarian and development support

The UN World Food Programme (WFP) had the most mentions, providing food aid in 18 of the 33 years. Other key UN agencies and INGOs delivering support were FAO, CRS, Oxfam, Save the Children and Plan International. National governments also provided some assistance. Seed companies had one reference supporting farmers.

The data shows WFP has been one of the longest serving aid agencies in Jonglei. But several INGOs have also sustained programs to help strengthen food security, livelihoods and community resilience to recurrent shocks and hazards.

|  |  |  |
| --- | --- | --- |
| **Organization Type** | Specific Organizations | Frequency |
| UN and INGOs | WFP | 18 |
| FAO | 7 |
| Other (UNHCR, UNICEF, WHO, IOM, NPA etc.) | 6 |
| CRS | 4 |
| Oxfam | 3 |
| Plan International | 3 |
| Save the Children | 3 |
| Care | 2 |
| ICRC | 2 |
| Government | Government of South Sudan | 3 |
| Government of Sudan | 1 |
| **Private Sector** | Seed companies | 1 |

Type of support

The most predominant support was food aid distributions during climate disasters and conflicts, provided in 18 years.

Crop seeds were also frequently distributed to restore livelihoods after hazards impacted farming. Livestock restocking was occasionally done.

Shelter support helped displaced people during the conflict years. Some years also had rural development and health interventions.

The 'Other' support mentioned comprised:

* Clothing provided during displacement crises
* Fishing equipment given in flood-affected areas
* Hygiene items distributed during disease outbreaks
* Vouchers for seeds and livestock provision

The data shows strong emphasis on short-term relief during crises, although some recovery and resilience building programs were also conducted over the years.

|  |  |
| --- | --- |
| **Type of Support** | Frequency |
| Food distribution | 18 |
| Crop seeds distribution | 12 |
| Livestock distribution | 4 |
| Agricultural tools | 3 |
| Cash-based assistance | 3 |
| Shelter provision | 8 |
| Health programs | 3 |
| Water/sanitation support | 2 |
| Rural development programs | 3 |
| Other | 5 |

# Discussions

## Role and impact of the organizations in helping the food security and resilience in Jonglei

The recurring climate disasters, conflicts and displacements in Jonglei have necessitated major humanitarian relief efforts over decades. Organizations like WFP have provided lifesaving food aid during the frequent droughts, floods and violence-induced crises. FAO has distributed seeds, tools, and livestock to help restore agricultural livelihoods post-shocks. INGOs like CRS, Save the Children and Oxfam have also given food, shelter and WASH support.

This aid has been invaluable for vulnerable communities struggling with hunger, loss of assets, injuries and displacement. Food drops by WFP during isolated drought years prevented starvation for thousands. Provision of fast-maturing seeds by FAO enabled planting after floods delayed farming seasons. Cholera vaccines administered by WHO curtailed outbreaks. The timeline data shows aid reaching even remote areas annually.

However, the support has largely focused on short-term relief rather than long-term resilience building. The recurrent need for assistance indicates aid dependency and lack of self-reliance in withstanding shocks. Some resilience initiatives like FAO's drought tolerant seed distribution are evident, but not done at scale. The loss of crop diversity and indigenous knowledge due to recurrent hazards also continues unabated. To build systemic resilience, South Sudan requires a coordinated strategy between government, UN agencies, NGOs and communities.

1. Safety nets like community granaries, livestock banks, and grain reserves must be built. Crop and diet diversity needs to be restored by conserving heirloom varieties and promoting traditional nutritious foods. This improves resilience to climate stresses.
2. Climate-smart agriculture approaches like small-scale irrigation, conservation agriculture and integrated pest management should be scaled up to increase productivity sustainably even during erratic rains or pest outbreaks.
3. Pastoralist communities need accessible veterinary care and fodder reserves to manage livestock diseases and droughts. Milk yields improvements can nourish children.
4. Investing in local peacebuilding and social cohesion is essential. Peace forums engaging youth from conflict-prone groups help reconcile attitudes.
5. Women, who drive household nutrition and agricultural labor, need greater land rights and inclusion in climate adaptation and livelihoods programs.
6. The government can coordinate with organizations on these initiatives through its food security, disaster risk reduction and peace commissions. Relief assistance should align to long-term goals like seed security. Involving communities in program design also builds ownership.
7. Ultimately effective aid is one that makes itself redundant by enabling at-risk communities to flourish despite hazards. By making livelihoods disaster-proof, climate resilient and conflict-sensitive, the recurring shocks in Jonglei can transform into opportunities for securing shared prosperity.

# Conclusion

The 33-year hazard timeline for Jonglei state in South Sudan underscores the immense vulnerability of agro-pastoralist communities to interconnected risks from climate change, conflicts, and food insecurity[[14]](#footnote-14). The analysis reveals complex dynamics between recurring climate stresses like droughts and floods, persistent violence from cattle raids and civil wars, displacement crises, and chronic hunger and malnutrition[[15]](#footnote-15).

The data documents the frequent loss of lives, livelihood assets, homes, and disruption of local food systems due to these co-occurring shocks and stressors[[16]](#footnote-16). Each hazard magnifies the impacts of others. The damage to seed reserves and indigenous crop diversity from repeated natural disasters and conflict-induced displacement emerges as a grave concern, undermining climate resilience and food self-sufficiency. While relief assistance has saved lives, the chronic crises signify systemic gaps in coping capacity, social cohesion, and livelihood security for effectively withstanding risks[[17]](#footnote-17). A paradigm shift is imperative, from short-term aid to long-term, eco-socially sustainable solutions that strengthen community resilience.

The multifaceted analysis of hazards in Jonglei, South Sudan, from 1990 to 2022, reveals a complex landscape of climatic, geological, and socio-political challenges. The Humanitarian-Development-Peace (HDP) Nexus emerges as a critical framework to understand and address these challenges. This conclusion synthesizes the key findings and outlines a future roadmap, emphasizing the dynamics of the HDP Nexus.

Key Findings

1. **Climatic Hazards**: Recurrent droughts, floods, and high temperatures have disrupted food systems, necessitating a coordinated HDP response.
2. **Conflict Dynamics**: Inter-communal conflict, occurring so many years, underscores the need for integrated peacebuilding within the HDP Nexus.
3. **Emerging Concerns**: Soil nutrient loss and other environmental challenges call for a development-oriented approach that aligns with humanitarian and peace objectives.
4. **Health Challenges**: Cholera outbreaks and livestock diseases highlight the need for an HDP approach to public health.
5. **Normal Years**: Seven normal years offer insights into stability and resilience, providing a baseline for HDP interventions.

Future Roadmap

1. **Climate Adaptation Strategies**: Implementing climate-smart agriculture within the HDP Nexus can foster resilience to climatic stresses (FAO, 2017).
2. **Peacebuilding Initiatives**: Integrating peace forums and social cohesion within the HDP framework can address conflict (UNDP, 2019).
3. **Environmental Stewardship**: Aligning sustainable land management with the HDP Nexus can enhance environmental resilience (World Bank, 2021).
4. **Health Interventions**: An HDP approach to healthcare can mitigate human and livestock diseases (WHO, 2018).
5. **Women Empowerment**: Promoting women's rights and inclusion within the HDP framework can enhance community resilience[[18]](#footnote-18).
6. **Coordinated HDP Strategy**: A multi-sectoral HDP approach involving government, UN agencies, NGOs, and communities is essential for systemic resilience. Aligning relief with long-term goals like seed security fosters sustainability.
7. **HDP Monitoring and Evaluation**: Continuous HDP monitoring ensures adaptive management and responsiveness to emerging challenges.

# Final Thoughts

The HDP Nexus offers a transformative framework for Jonglei, linking immediate humanitarian needs with long-term development goals and peacebuilding efforts. By integrating these three dimensions, the region can navigate the complex interplay of climatic, social, and economic factors to build sustainable resilience. The synthesis of historical data with the HDP Nexus provides a blueprint for action that is both empirically grounded and visionary. Future collaboration across the humanitarian, development, and peace sectors will be vital in realizing this vision for a resilient Jonglei. The roadmap herein serves as a strategic guide, emphasizing the centrality of the HDP Nexus in shaping a prosperous and stable future for Jonglei.

# Annexe 1: List of hazards

# (need to check this again)

Here is a summary timeline of the major hazards and events from 1990 to 2022 based on the data provided:

1990 - Earthquake (climate hazard), excessive floods (climate hazard). Conflict between Murle and Nuer over cattle raiding.

1991 - Drought (climate hazard). Breakaway of Machar from SPLA joining Sudan govt (conflict). Nuer-Dinka conflict over cattle.

1992 - Drought (climate hazard). Nuer-Dinka conflict. Introduction of new sorghum variety by Dr. Riak Machar.

1993 - Drought (climate hazard). Nuer-Murle conflict over cattle. Livestock disease outbreak.

1994 - Drought (climate hazard). Intra-communal Nuer conflict over cattle. WFP food aid.

1995 - Drought (climate hazard). Murele-Dinka conflict over cattle.

1996 - Drought (climate hazard). Mundari raid Dinka cattle. SPLA-Sudan army war. Sudan govt food aid.

1997 - Floods (climate hazard). Murle-Nuer conflict over cattle.

1998 - Nuer-Murle conflict over cattle. WFP food aid.

1999 - SPLA-Sudan army war. WFP food aid.

2000 - Murle raid Nuer cattle. WFP food aid.

2001 - Murle-Nuer cattle raid conflict. WFP food aid.

2002 - Murle raid Nuer cattle. WFP food aid.

2003 - Murle-Nuer cattle raid conflict.

2004 - Drought (climate hazard). Murle-Nuer cattle raid conflict. WFP food aid.

2005 - Murle raid Nuer cattle. WFP & ICRC aid.

2006 - Murle raid Nuer cattle. WFP & ICRC aid.

2007 - Cattle disease outbreak. Murle raid Nuer cattle.

2008 - Drought (climate hazard). Murle raid Nuer cattle. WFP food aid.

2009- Drought (climate hazard). Murle-Nuer conflict and displacement. WFP food aid.

2010 - Drought (climate hazard). Yau Yau rebellion. WFP food aid.

2011 - Drought (climate hazard). Murle raid Nuer cattle. WFP food aid.

2012 - Floods (climate hazard). Murle-Nuer cattle raid conflict.

2013 - Conflict between govt-IO, Murle-Nuer conflict. Displacement.

2014 - Govt-IO conflict, Murle-Nuer conflict. WFP & FAO food and seed aid.

2015 - Floods and dry spell (climate hazard), Murle-Nuer cattle raid conflict. WFP, FAO, NGO aid.

2016 - Murle-Nuer conflict, NGO evacuation.

2017 - Floods (climate hazard). Dinka Bor attack Murle. WFP, NGO aid.

2018 - Floods (climate hazard). Murle-Nuer cattle raid conflict. WFP, NGO aid.

2019 - Inter-clan revenge killings. WFP, FAO, NGO aid.

2020 - Floods (climate hazard). WFP, NGO aid.

2021 - Floods (climate hazard). Dinka-Nuer attack Murle. WFP, NGO, WHO aid.

2022 - Floods, dry spell, rains (climate hazard). Murle-Nuer cattle raid conflict. WFP, FAO, NGO aid.

# Annexe 2: Heatmap of the hazards

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hazard | **Inter-communal conflict** | **Other conflict hazard** | Drought | Excessive floods | High temperatures | Soil nutrient loss | **Cattle raiding** | **Displacement due to attacks** | Other climate hazard | **Conflict: Gov vs Community** | **Other pest/disease hazard** | **Other hazard** | Delayed rainfall | Low rainfall | **Livestock disease** |
| **Total** | **29** | **13** | **11** | **11** | **11** | **9** | **7** | **7** | **6** | **5** | **5** | **4** | **3** | **2** | **1** |
| 1990 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1991 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1992 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 1993 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1994 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 1995 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 1996 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 1997 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1998 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1999 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 2000 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 2001 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2002 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 2003 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2004 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2005 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2006 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2007 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 2008 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2009 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2011 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2012 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2013 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2014 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2015 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| 2016 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2017 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2018 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2019 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2020 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2021 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2022 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |

Overview of the data gathered from Jonglei, South Sudan, from 1990 to 2022:

1. Drought: Occurred 11 times over the 33-year period. It appears to be a recurring issue but not consistent every year.

2. Floods: Also occurred 11 times, but the distribution over the years is different from droughts.

3. High Temperature: This hazard occurred 11 times as well, mirroring the frequency of droughts.

4. Low Rainfall: A less frequent occurrence, with only 2 instances.

5. Delayed Rainfall: Occurred 4 times, indicating it might be a concern but not a major one.

6. Early Rainfall: No instances recorded.

7. Soil Nutrient Loss: Occurred twice, recently in 2021 and 2022.

8. Dry Spell: Similar to soil nutrient loss, occurred twice.

9. Earthquake: A single occurrence, making it a rare event.

10. Inter-communal Conflict: The most frequent hazard, occurring 22 times. This indicates a persistent and serious issue in the region.

11. Conflict: Govt-IO: Occurred 4 times, specifically in recent years.

12. Civil War: Occurred twice.

13. Livestock Diseases: Occurred twice, indicating it might not be a major concern.

14. Crop Pests: Occurred twice, once in 1998 and again in 2022.

15. Cholera Outbreak: A single occurrence in 2001.

16. Normal Year: 7 years were classified as normal, indicating no significant hazards.

17. NGO Evacuation: A single occurrence in 2016.

18. New Variety Introduction: No instances recorded.

**Summary**

* Most Frequent Hazards: Inter-communal conflict, drought, floods, and high temperature.
* Least Frequent Hazards: Earthquake, cholera outbreak, NGO evacuation, soil nutrient loss, dry spell, livestock diseases, and crop pests.
* Emerging Concerns: Soil nutrient loss appears to be a recent concern.
* Stable Periods: 7 years were identified as normal, with no significant hazards.

This data provides valuable insights into the complex interplay of climatic, geological, and social factors affecting Jonglei. It underscores the need for multifaceted approaches to address the recurring issues, particularly conflicts and climatic hazards like droughts and floods, and to build resilience in the face of these challenges.

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