

# Gender, Indigenous Peoples Presence and Water Assessment for the Upper Nile Water Management Zone, Uganda

Component 3 of G4DR - D3.3



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## Executive Summary

This Gender, Indigenous Peoples Presence, and Water Assessment examines how gender inequality and social exclusion shape groundwater access, use, and governance in Uganda's Upper Nile Water Management Zone (UNWMZ). Groundwater is the principal domestic and agricultural water source for rural communities in the zone, yet its governance systems, infrastructure reliability, and benefits are unevenly distributed across gender, age, and vulnerability lines.

Drawing on national data, literature, and field visits to four communities across Gulu and Amuru Districts, the assessment identifies persistent socio-economic disparities—particularly in income, education, land rights, and household poverty—that directly influence groundwater access. Women and girls bear the largest burden of water collection and household sanitation management, yet they remain underrepresented in water governance structures and have limited influence over decisions about borehole siting, maintenance, and fee structures. Youth, persons with disabilities, and elderly persons face physical, social, and financial barriers that further constrain equitable groundwater access.

Across the zone, borehole reliability is a critical concern: high non-functionality, weak operation and maintenance (O&M) systems, delayed repairs, and frequent vandalism result in heavy reliance on unsafe open wells and springs shared with livestock. These failures increase exposure to waterborne diseases such as typhoid and heighten the time and physical burdens on women and girls. Financial exclusion is widespread, with poor households—often female-headed—unable to afford user fees and therefore compelled to use unsafe sources. Weak transparency in Water User Committees (WUCs), including poor financial record-keeping, limits community trust and sustainability.

Climate vulnerability intensifies these pressures. Communities report increasingly erratic rainfall, declining agricultural productivity, and growing dependence on groundwater for domestic and livelihood needs. Limited adoption of irrigation, lack of inclusive extension services, and poor sanitation infrastructure further restrict resilience. Women's and girls' health and education are

disproportionately affected, particularly through menstrual hygiene constraints, unpaid care burdens, and increased exposure to SGBV when walking long distances for water.

The assessment proposes a targeted, realistic set of actions for the G4DR project to strengthen groundwater governance and embed Gender Equality and Social Inclusion (GESI) principles in the Upper Nile WMZ. Recommended actions include enhancing community-level O&M skills, improving financial transparency and inclusive decision-making in WUCs, promoting safe water handling, documenting social inclusion barriers to water access, integrating disability-inclusive design, engaging youth in groundwater stewardship, and using local climate observations to refine groundwater assessments. These interventions reinforce one another and are aligned with both field evidence and national policy priorities.

Ultimately, strengthening groundwater reliability and embedding gender-responsive governance will reduce disease risk, alleviate the extreme time poverty faced by women and girls, and enhance climate resilience for the UNWMZ. Implementing these measures positions G4DR to contribute a scalable, socially inclusive model for groundwater management across Uganda and the broader region.

# List of Acronyms

AfDB – African Development Bank  
AMCOW – African Ministers’ Council on Water  
DWRM – Directorate of Water Resources Management  
FGD – Focus Group Discussion  
FPIC – Free, Prior and Informed Consent  
G4DR – Groundwater for Advancing Resilience Project  
GESI – Gender Equality and Social Inclusion  
GoU – Government of Uganda  
IIASA – International Institute for Applied Systems Analysis  
IMF – International Monetary Fund  
IWMI – International Water Management Institute  
LCI / LCII – Local Council One / Local Council Two  
MGLSD – Ministry of Gender, Labour and Social Development  
MHM – Menstrual Hygiene Management  
MWE – Ministry of Water and Environment  
O&M – Operation and Maintenance  
OPHI – Oxford Poverty and Human Development Initiative  
PWD – Person with Disabilities  
SGBV – Sexual and Gender-Based Violence  
SDGs – Sustainable Development Goals  
TEK - Traditional Ecological Knowledge  
UBOS – Uganda Bureau of Statistics  
UNWMZ – Upper Nile Water Management Zone  
UN Women – United Nations Entity for Gender Equality and the Empowerment of Women  
UNICEF – United Nations Children’s Fund  
VHT – Village Health Team  
WASH – Water, Sanitation, and Hygiene  
WUC – Water User Committee  
WMZ – Water Management Zone  
WHO – World Health Organization

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# **1. Introduction: Integrating gender equality and social inclusion into groundwater management**

Groundwater is not merely a hydrological asset—it is a social, cultural, and economic lifeline. Its value cannot and should not be reduced to volumetric extraction figures alone. As the World Bank (2023) emphasizes, groundwater underpins water and food security, playing a vital role in poverty reduction, livelihoods enhancement, and climate-resilient development. For billions, especially in rural and peri-urban areas, it is the primary—sometimes only—source of clean water. Despite this, groundwater remains largely invisible in policy and governance, often mismanaged and overexploited due to its nature as a common-pool resource that lacks clear mechanisms for equitable and sustainable stewardship.

Within the framework of the Sustainable Development Goals (SDGs), groundwater is directly and indirectly tied to several key goals. It is foundational to SDG 6 (clean water and sanitation) but also contributes meaningfully to SDG 1 (poverty eradication), SDG 2 (zero hunger), SDG 5 (gender equality), SDG 11 (sustainable cities), SDG 13 (climate action), and SDG 15 (life on land). Realizing the transformative potential of groundwater for these goals requires an explicit and intentional focus on Gender Equality and Social Inclusion (GESI)—not as an afterthought, but as a central design and implementation principle.

This assessment is part of the Groundwater for Advancing Resilience (G4DR) in Africa project which aims to enhance water security and climate resilience across the African continent by promoting the sustainable use of groundwater development and management.

The project is Funded by Global Environment Facility (GEF), implemented by Food and Agriculture Organization of the United Nations (FAO) and executed by the International Water Management Institute (IWMI), the International Institute for Applied Systems Analysis (IIASA) in collaboration with a strong consortium of regional and national partners: African Ministers' Council on Water (AMCOW), Southern African Development Community – Groundwater Management Institute (SADC-GMI) and National water ministries in Benin, Malawi, Mozambique, Togo, and Uganda.

## 1.1. Objectives and Approach

In this assessment, we examine how GESI dimensions intersect with groundwater management in the Upper Nile Basin, in Uganda, to generate recommendations for incorporating GESI into groundwater management. Our analysis is guided by the following considerations:

- Context: i) How gendered inequalities in education, income, land tenure, and poverty influence groundwater access and decision-making; and ii) The role of intersectionality in shaping groundwater vulnerability and resilience.
- Gender, agricultural land and water uses: i) The divide between male-dominated commercial irrigation and female-led smallholder production; and ii) Constraints in women's access to irrigation infrastructure, pumps, and credit.
- Gender, sanitation, and health: i) How lack of groundwater access affects menstrual hygiene, maternal health, and disease burdens; and ii) The role of women in ensuring household water quality and health.
- Decision-Making and Empowerment: i) Degree and depth of women's and marginalized groups' involvement in groundwater committees, planning, and governance; and ii) Strategies for transformative inclusion, leadership development, and accountability.

### **Box 1: Statement on Indigenous and Local Communities in the Upper Nile Water Management Zone**

In the Upper Nile Water Management Zone, the social landscape is defined not by rigid tribal borders, but by a "living mosaic" of identities shaped by movement, survival, and shared resources. Across West Nile, Lango, Acholi, and Karamoja, ethnic diversity is a dynamic force where community boundaries are often fluid. In the West Nile, indigenous groups like the Lugbara and Madi live in a state of deep interdependence with over a million refugees from South Sudan and the Democratic Republic of Congo. This has created a transnational social fabric where languages blend and households are often composed of both host and displaced members, all drawing from the same fragile aquifers.

Groundwater Impact: Water demand in settlements like Bidibidi and Rhino Camp has led to an over-reliance on local aquifers. While 90% of water supply in these settlements is now delivered via piped systems (often motorized boreholes), the sheer volume of extraction creates localized

"drawdown" cones, potentially lowering the water table for surrounding indigenous host communities.

In the Lango and Acholi sub-regions, the aftermath of two decades of civil war has further reshaped ethnic identity. The long period spent in displacement camps forced different clans and ethnic subgroups to live in close proximity, leading to significant intermarriage and a blurring of traditional lineage lines. As these communities return to their ancestral lands, they do so not as isolated tribes, but as a socially complex population attempting to reconstruct a collective identity while navigating intense disputes over land—often the very land where groundwater points must be situated.

Groundwater Impact: The war resulted in the massive destruction of water infrastructure. Currently, many returnee communities rely on shallow wells and hand-pumped boreholes that were poorly maintained or damaged during the IDP camp era. High rates of land disputes (affecting 33% to 50% of landholders) complicate the siting of new groundwater points, as traditional land markers were often lost during displacement.

Further east of Uganda, in Karamoja, exists a "dual crisis" of chronic drought and resurgent cattle rustling causing neighbouring conflict. The diversity is found in the distinct pastoralist groupings such as the Matheniko, Jie, and Bokora—whose identities are traditionally tied to cattle and specific grazing routes. However, persistent drought and the pressure of neighboring conflicts have forced these groups into more frequent contact and competition. This has transformed the region into a complex theater of shifting alliances, where "who belongs where" is often dictated by the seasonal availability of water.

The concentration of livestock around a few functional "valley tanks" or boreholes often triggers conflict between clans (e.g., the Matheniko and Jie) especially during long droughts where groundwater levels drop significantly. For the Karamojong, groundwater is not just a domestic resource but a survival asset for pastoralism. G4DR activities in this region should integrate Traditional Ecological Knowledge (TEK) with modern hydrogeological monitoring to manage the "asymmetrical distribution" of water resources that often fuels armed raiding.

In these three regions, an ethnic group is rarely a single, isolated entity; rather, it is a part of a larger, interdependent social system. Managing groundwater in this context requires more than just technical drilling; it requires navigating a social fabric where water rights are tied to historical migration, post-war resettlement, and the shared vulnerability of diverse peoples living on the front lines of climate change.

## 1.2. Gender and groundwater

Women and girls are central actors in groundwater use but remain marginalized in its governance. They are primarily responsible for domestic water collection, sanitation, small-scale farming, and family health, all of which are deeply reliant on groundwater. Yet, decision-making roles in groundwater governance structures, including community water user associations and local government forums, are often occupied by men. As a result, the systems governing this critical resource frequently fail to reflect or respond to women's priorities and lived realities.

Studies, including those by Nigussie et al (2018) and Nigussie and Mandara (2017), have shown stark gender disparities in:

- Uses of groundwater (e.g., irrigation vs. domestic and hygiene needs);
- Access to infrastructure and technologies, such as boreholes and pumps;
- Involvement in groundwater monitoring and planning;
- Voice and influence in decision-making bodies; and
- Capacity to adapt to changes like aquifer depletion and contamination.

Women's participation is often symbolic rather than substantive. Social norms, cultural expectations, time poverty due to care responsibilities, and lack of technical training serve as persistent barriers. Nigussie and Mandara (2017) reminds us that numerical representation alone—such as fulfilling quotas—does not guarantee empowerment. Genuine participation requires creating enabling environments that value women's knowledge, support their leadership, and address power asymmetries in both formal and informal governance systems.

## 1.3. Youth and groundwater

Youth represent both the present and the future of groundwater stewardship. In many regions, young people—particularly those in rural settings—are key labourers in smallholder agriculture, water fetching, and livestock care, all of which depend heavily on groundwater. However, youth

are frequently excluded from groundwater governance, policy dialogues, and capacity-building programs (Nigussie and Mandara, 2017).

Key challenges include:

- Limited access to land and water rights, which constrains productive use.
- Lack of representation in water user associations or planning committees.
- Underrepresentation in groundwater-related vocational and technical education; and
- Few economic incentives or employment opportunities in groundwater management or conservation.

Integrating youth meaningfully requires targeted investments in skills development, access to data and innovation (e.g., digital water monitoring tools), entrepreneurship, and mechanisms that enable youth voice in institutional processes. This not only addresses intergenerational equity but also leverages the dynamism and innovation capacity of young people in adapting to groundwater challenges exacerbated by climate change and population growth.

#### **1.4. Vulnerable and marginalized groups and groundwater**

Beyond gender and age, vulnerability in groundwater access and governance is shaped by intersecting factors such as disability, ethnicity, caste, indigeneity, geographic isolation, and poverty status. Many marginalized communities live in areas where groundwater quality is poor, aquifers are overdrawn, or infrastructure is inadequate or discriminatory (Adams et al, 2018).

For example:

- Indigenous groups may have traditional water knowledge systems that are ignored in formal water governance.
- Persons with disabilities may face physical barriers in accessing community wells or boreholes.
- Ethnic minorities in politically marginalized areas may be bypassed in infrastructure planning.

Inclusion here must go beyond "invitation to participate"—it must involve deliberate efforts to recognize, accommodate, and empower these groups in water resource planning and benefit-sharing. Legal frameworks, institutional mandates, and implementation mechanisms must align to protect customary rights, ensure non-discriminatory access, and promote socially just water allocation.

## 2. Methods

By making GESI central to groundwater management, we not only address longstanding inequalities but also enhance the sustainability, resilience, and legitimacy of groundwater systems. Equitable access, inclusive governance, and socially responsive groundwater planning are prerequisites for achieving the SDGs and ensuring water security.

For this assessment, we consulted various data sources on Uganda’s Upper Nile Water Management Zone (UNWMZ). These sources provided general information and insights into the basin, its people, and their livelihoods linked to GESI and groundwater management. Additionally, we conducted field visits and spoke with community members in four communities to discuss pertinent issues. The goal of the discussions was not to gather extensive data, but rather to gain on-the-ground insights into issues already identified through data and literature. The communities engaged are as follows in Table 1:

*Table 1. Geographical spread of communities visited*

<b>Catchment</b>	<b>District</b>	<b>Sub-county</b>	<b>Parish</b>	<b>Village</b>
Aswa	Gulu	Owalo	Lugore	Paipeno Abunga
Albert Nile	Amuru	Lamogi	Coke Kagoro	Tekwii Kaladima

These discussions were executed in collaboration with the Ministry of Water and Environment (MWE) and District Local Governments. Each Focus Group Discussion (FGD) consisted of a maximum of 12 participants. The composition was designed to ensure diverse representation of community. Additionally, gender balance was strongly considered, to ensure a robust discussion on GESI. At least 50% female and males participated in the discussion across all categories. Cumulatively, four FGDs were held and 48 individuals participated as presented in Table 2.

*Table 2. Composition of Focus Groups*

<b>Participants S/n</b>	<b>Category</b>	<b>No. Participants</b>
1.	Women	8
2.	Youth	4
3.	Elderly	4

4.	Person With Disability (PWD)	4
5.	Water User Committee (Chairperson, Treasurer, Caretaker)	12
6.	Peasant Farmers	8
7.	Local Council 1 (LCI) Chairperson	4
8.	Local Council 2 (LCII) Chairperson	4
<b>TOTAL</b>		<b>48</b>

Findings from these discussions will be presented in Section 3 of this document.

The primary objective was to understand how different social groups (especially women, youth, and vulnerable people) interact with groundwater resources, the challenges they face regarding access and control, and how they can be more effectively included in groundwater governance and planning.

These FGDs were critical for complementing the technical and hydrological assessments by providing essential qualitative data on the social and gender dynamics surrounding groundwater use and management.

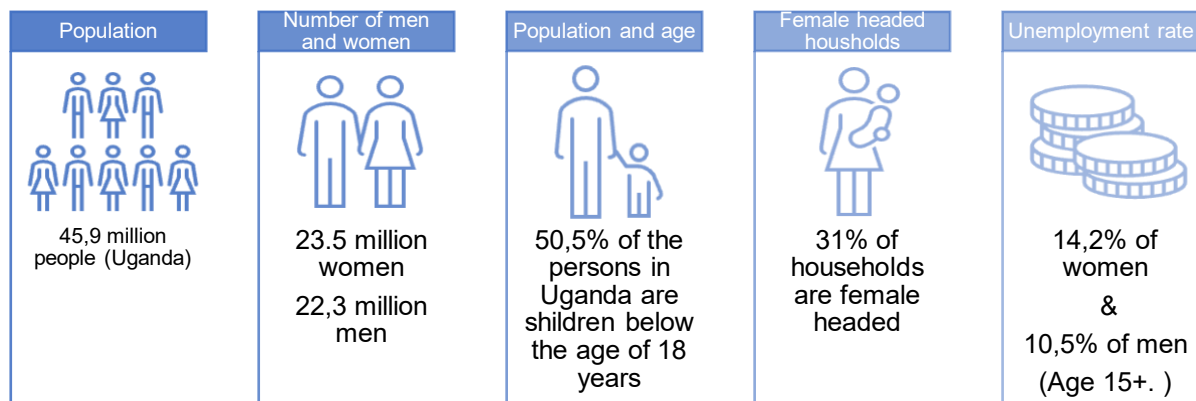
### **3. Findings**

Groundwater plays a crucial role in ensuring water and food security for the UNWMZ. However, its governance and use are deeply influenced by entrenched gender norms, socioeconomic inequalities, and limited institutional inclusiveness. Applying a GESI lens to groundwater management is essential not only to achieve equitable outcomes but also to enhance sustainability, resilience, and community ownership.

Despite the centrality of groundwater to daily life, particularly for women and youth, decision-making power over its use and infrastructure development remains heavily male-dominated. Women, youth, and marginalized groups are often left out of formal governance spaces, despite bearing the greatest burden of water collection and being primary users of groundwater for domestic and agricultural activities.

In Uganda, the Upper Nile Water Management Zone (UNWMZ), encompassing the Albert Nile, Aswa, and Kidepo catchments that feed into the Albert–White Nile system, has been prioritized due to its strategic importance for agriculture, domestic water supply, and transboundary river systems. Approximately 70% of the population relies on groundwater accessed through boreholes and springs, while water availability and quality are increasingly shaped by seasonal rainfall variability, prolonged droughts, rapid population growth, agricultural expansion, urbanization, and a significant refugee influx. Within this context, gender equality and social inclusion dynamics—particularly gendered divisions of labour, unequal access to land and productive resources, and limited participation of women, youth, and other marginalized groups in water decision-making—strongly influence who benefits from and who bears the costs of water management. Project activities therefore focus on strengthening basin-level data collection and governance frameworks, integrating groundwater considerations into planning processes, building technical and institutional capacity, and facilitating more inclusive and equitable participation in groundwater decision-making.

### 3.1 Socio-economic context



Statistics sourced from: UBOS (2025a, and 2025b)

According to a 2022 report on multidimensional poverty in Uganda (UBOS, 2022), 49% of female-headed households were classified as multidimensionally poor, compared with 39% of male-headed households. The same report shows that overall, 42.1% of Ugandans were multidimensionally poor (i.e., experiencing deprivations across health, education, living standards, etc.). A 2023/24 national survey by the Uganda Bureau of Statistics (UBOS, 2025c) shows that rural households remain disproportionately poor: 47.6% of rural households fell into the lowest 40% consumption bracket (the poorest 40%), while only 27.0% of urban households did.

From these statistics it is clear that nationally, nearly half of households experience multidimensional poverty; rural households are worse off than urban ones; female-headed households face slightly higher multidimensional poverty rates than male-headed households. Education levels are lower for many rural women. Given that the Upper Nile WMZ covers mostly rural and semi-rural districts, these national-level statistics suggest that:

- A substantial proportion of households in the UPWMZ are likely to be multidimensionally poor — especially among female-headed households.
- Women heading households in the UPWMZ are disproportionately likely to face multiple deprivations (poverty, limited access to services, limited assets), with likely implications for water access, affordability of borehole repairs, and willingness/ability to invest in water infrastructure.
- The rural-urban divide in poverty underscores the elevated vulnerability of rural water users in UPWMZ when it comes to access, maintenance, and equitable participation in water governance.

In terms of education, multiple empirical studies and major data sources (Achum, 2008; Acio, 2012; United Nations, 2012; Atim, 2018; Bridges and Scott, 2019; Kazibe, 2023) find that exposure to armed conflict in Uganda, particularly the LRA (The Lord’s Resistance Army) insurgency in northern Uganda and earlier periods of instability, caused cohort-level declines in years of schooling and literacy. The negative effects are larger for females in affected areas, producing the persistent pattern of relatively low educational attainment among today’s older women in the most affected regions. Women who are currently “older” (for example, those who were children or adolescents in the 1980s–2000s) experienced schooling during the periods of highest local violence (Amin/Obote upheavals, NRA war, and especially the LRA insurgency in the north). Because the interruptions occurred during their formative schooling years, those cohorts entered adulthood with fewer completed grades and lower literacy; subsequent improvements in national education policy mainly benefited younger cohorts.

According to a 2024 brief by UN Women in Uganda, the overall employment rate among working-age adults (15+) shows a gender gap: women face lower employment rates than men. For example, as of their most recent labour-market data, the employment gap is 6.8 percentage points: women’s employment rate is 73.6% while men’s is 80.4% (UN Women, 2023). The same report finds that wage disparities remain large: the unadjusted hourly gender pay gap in Uganda is 25.2%, meaning women earn on average 25.2% less per hour than men in comparable jobs. At the monthly wage level the gap widens: women earn 32.3% less than men on monthly earnings

(UN Women, 2023). Labour-market structure also shows a high reliance on informal employment for women: in wage employment, 59.3% of women are informal workers (versus 69.9% of men in the referenced UN Women dataset, but importantly many women remain outside stable formal employment) (UN Women, 2024). In addition, recent national data show that among working-age adults, just 39.3% of women were active in the labour force in 2021, compared to 57.9% of men, this indicates a gap of 18.6 percentage points (UN Women, 2024). Finally, a significant share of female youth (18–30 years) remain economically inactive or under-employed: in subsistence work (agriculture, petty trade) a majority are women which tend to be low-paid and insecure jobs (UN Women, 2024).

## **3.2 Implications of gendered inequalities for groundwater management**

### **3.2.1 Education gap — Implications for groundwater access & management**

Uganda has a persistently wide gender gap in education, which has direct implications for water access, groundwater management, and community participation in water governance. Nationally, only 31% of women have completed secondary education or higher compared with 40% of men (Afrobarometer, 2024). Rural areas such as those that make up the majority of the Upper Nile WMZ face even greater disparities; households where the head has no formal education experience significantly higher multidimensional poverty, with 49% of female-headed households classified as multidimensionally poor compared with 39% of male-headed households (Afrobarometer, 2024). These disparities shape women’s access to water information, their ability to navigate technical systems, and their participation in decisions related to groundwater use, borehole maintenance, and cost recovery. In the Upper Nile WMZ, where safe water access often depends on boreholes, protected springs, and community-managed systems, limited education among women reduces their influence in governance processes and limits the effectiveness of groundwater management structures.

- **Management risk:** Groundwater management requires understanding concepts such as water-table variability, sustainable yield, pump mechanics, borehole maintenance cycles, safe water chain practices, and contamination risks. Lower education levels among women—especially rural women—mean they often lack opportunities to develop technical literacy or to interpret information delivered by Water User Committees (WUCs), District Water Offices, or NGOs. As a result, women may not feel confident participating in

groundwater-related decision-making processes. In many UPWMZ sub counties, local water governance meetings use English or technical terms without translation into Acholi, Iteso, or local languages. Women with limited schooling—especially older women—may not understand these discussions and thus disengage, leading to male-dominated decision-making around borehole repair timing, cost-sharing, and source prioritisation.

Technical training for pump repair, handpump maintenance, or water-quality monitoring often assumes a baseline level of literacy or numeracy. When training is delivered using diagrams, manuals, or written forms, women with lower education may struggle to participate. Groundwater management becomes dependent on a small number of trained men. When these men migrate or become unavailable, water points fall into disrepair. This is particularly critical in the Upper Nile WMZ, where non-functional borehole rates can reach 20–30% in some districts—a major risk to household water security (Monitor, 2024).

- **Opportunities:** Despite the challenges posed by educational disparities, there are practical ways to make groundwater governance in the Upper Nile WMZ more equitable and resilient. Training programs can be redesigned to accommodate participants with low literacy, especially women, by using visual tools, demonstrations, local language translations, peer mentoring, and community-based learning. These approaches have proven effective in Uganda’s WASH sector, particularly for women caretakers and Village Health Teams. Programs that train women’s groups—such as Mother’s Unions, Savings Groups, or local farmers’ groups—in basic borehole maintenance, water quality observation, and pump monitoring can significantly enhance system sustainability.

Additionally, promoting women’s leadership in Water User Committees (WUCs) through tailored, gender-sensitive capacity building increases the effectiveness and responsiveness of water governance. Clear communication using local languages and pictorial formats reduces exclusion due to low literacy. Leveraging women’s central role in household water management allows them to act as early detectors of borehole failures and advocates for vulnerable populations. Integrating groundwater education into existing community groups further lowers barriers linked to formal schooling, making awareness-raising and community monitoring more accessible and impactful.

### 3.2.2 Income gap — Implications for groundwater access & management

In Uganda, entrenched gender inequalities in income and economic participation significantly influence access to water resources—including groundwater—and shape who benefits from groundwater management decisions. National labour market data indicate persistent gender pay gaps and labour-market disparities, with women disproportionately represented in informal, low-paid employment and earning less than men across comparable sectors (Wabusa et al, 2025). The informal sector in Uganda accounts for over half of national GDP and employs the majority of the workforce, with women overrepresented relative to men in unstable, low-security jobs (Wabusa et al, 2025). Consequently, women’s limited earnings constrain their access to financial services, credit, and investment capital compared with men (UN Women, 2024).

These economic disparities have direct implications for water access: women often bear the primary responsibility for household water collection and management yet have reduced ability to pay for improved water services or contribute to communal water system upkeep. This dynamic affects groundwater systems such as those in the Upper Nile WMZ, where groundwater is increasingly important for domestic supply, agriculture, and climate-resilience strategies (Ministry of Water and Environment, Uganda, n.d.).

- **Management Risk:** A critical risk in groundwater management stems from differential participation of men and women in governance. Across Africa, data show that women are significantly under-represented in water governance institutions, with only about 17 percent of national ministries responsible for water led by women and similarly low representation in related strategic positions (Oluwasanya et al, 2025). When local water user associations, catchment committees, or UPWMZ-level planning forums mirror such disparities, priorities tend to reflect the interests of more influential or financially empowered members, often men potentially bypassing women’s lived experiences as foremost users of water for household and small-scale agricultural needs (Oluwasanya et al, 2025). In contexts where community boreholes or groundwater pumps rely on user fees or repair funds, men may assume paying roles due to greater control over cash resources (Oluwasanya et al, 2025). This can skew investment and maintenance decisions toward infrastructure preferences that do not align with women’s needs for proximity, reliability, or ease of use. In turn, breakdowns in groundwater infrastructure may persist longer, disproportionately increasing women’s water collection burdens (Li, 2023).

Despite progress in mobile money and financial inclusion, women in Uganda remain less likely than men to access formal financial services such as bank loans or commercial credit, with only 35.8 % of adult women holding bank deposits and a mere 2.4 % borrowing commercially compared to 5.7 % of men (Paelo, 2023). Women also rely disproportionately on informal financial mechanisms (23 % vs. 15 % of men) and face socio-cultural barriers including lack of collateral and lower financial literacy, limiting their capacity to invest in household water improvements that depend on upfront capital (IMF, 2024). Groundwater offers a valuable buffer against climate variability and is key to sustaining water access in the Upper Nile WMZ under erratic rainfall and drought risk. However, the high capital requirements for enhanced groundwater development (e.g., deeper wells or mechanised pumps) may systematically exclude poor and female-headed households without deliberate financial inclusion measures.

- **Opportunities:** There are strong opportunities to enhance groundwater management by institutionalising gender-inclusive planning at all levels of UPWMZ governance. Policies and strategies that mandate or incentivise equitable representation of women in water management committees, catchment planning processes, and stakeholder consultations can help ensure that groundwater investment decisions reflect diverse household needs. Uganda’s broader water sector has historically pursued gender mainstreaming strategies, including affirmative actions to raise women’s participation in water planning and operations (Paelo, 2024). For the Upper Nile WMZ, integrating sex-disaggregated data on water use patterns, economic constraints, and time allocations into catchment management plans can support more responsive infrastructure placement and maintenance prioritisation, reduce inequities in access, and enhance long-term sustainability.

Additionally, addressing the income gap through targeted economic empowerment programs presents a dual opportunity: improving women’s economic wellbeing and enabling greater participation in groundwater management and technology adoption. This can take the form of microfinance schemes tailored for water-related technologies, credit guarantees for female entrepreneurs in the water sector, and training programs that build technical capacity for well maintenance and irrigation equipment operation. Empowering women economically supports broader community resilience in groundwater systems. For example, women with improved incomes are better positioned to contribute to community

repair funds, pay for borehole maintenance, or invest in small-scale irrigation that uses groundwater sustainably. Such investments can reduce the time spent on water collection, leading to more productive time for income-generating activities and education.

### **3.2.3 Land tenure gap — Implications for groundwater access & management**

In Uganda, gender disparities in land tenure are a prominent structural barrier with direct implications for access to groundwater resources and participation in water governance. Despite women constituting a significant portion of agricultural producers—providing up to 70–80 per cent of agricultural labour—formal land ownership by women remains markedly low, with estimates indicating that women own only approximately 16–28 per cent of land parcels and often have weaker tenure rights than men (Esaff Uganda, 2025; Landnet Uganda, 2025). These disparities are rooted in customary norms that condition women’s access to land on relationships with male relatives and in the limited implementation of statutory protections that theoretically guarantee equal rights. This uneven distribution constrains women’s ability to secure long-term investments and participate fully in land and water management decisions, especially in rural regions such as those covered by the Upper Nile WMZ in northern Uganda.

- **Management risk:** One of the core risks posed by the land tenure gap lies in the exclusion of women from land-based groundwater interventions. In rural Uganda, where customary tenure systems predominate—holding over 70 per cent of all land—formal titles are scarce and often biased in favour of men (Oxfam, 2021). Women’s land rights tend to be secondary, informal, or tied to male relatives’ titles, which limits transaction security and decision-making authority (Worldbank, 2016).

When groundwater management strategies are linked to landholding status—such as incentive payments for irrigation investments, groundwater recharge projects on private land, or land-use planning for conjunctive water-land management—women risk being systematically bypassed. These interventions typically require formal land rights or long-term tenure security to qualify for participation or compensation. Where land certificates or titles bear only male names, even women who actively work and invest in cultivation may be unable to benefit from programmes supporting groundwater-connected infrastructure. Such exclusion not only reinforces existing inequalities but also undermines effective participation of a substantial portion of the agricultural workforce in resource decisions (Landnet Uganda, 2025).

Secure land tenure is widely recognised as a precondition for investing in sustainable agricultural and water infrastructure, as property rights reduce risk and increase incentives for long-term investment. In Uganda, insecure tenure discourages investments in enhancements such as soak pits for managed aquifer recharge, household submersible pumps, or small-scale irrigation systems that depend on stable access to land. Women, in particular, are disadvantaged because tenure insecurity limits their ability to lodge claims for compensation or credit using land as collateral (Wabusa et al, 2025).

In the highly rural Upper Nile WMZ water resources planning often intersects with land management through activities such as catchment protection, erosion control, and localized irrigation development (Republic of Uganda, 2017). Without secure land rights, women's contributions to and benefits from such watershed management initiatives are diminished, increasing the risk that sustainable groundwater use plans may not reflect community-wide needs or local knowledge.

- **Opportunities:** Addressing the land tenure gap presents a clear pathway to enhance women's effective participation in groundwater management and planning. Improving tenure security through targeted land registration drives, gender-responsive titling, simplified documentation processes, and conflict resolution mechanisms, can help ensure that women have recognised, enforceable rights to the land they farm or inhabit. Empowering women with formally recognised land rights holds the potential to increase their ability to contribute to and benefit from groundwater investments, promote equity in decision-making forums, and enhance household resilience. This sentiment is already a priority for the government of Uganda as Minister for Lands, Housing and Urban Development, Hon. Judith Nabakooba, on behalf of The Prime Minister, Robinah Nabbanja, noted at the second National Symposium on Land Governance in Uganda (Paliament of the Republic of Uganda, 2025).

In the broader Ugandan policy context, national commitments to harmonise customary and statutory land rights, promote gender equity in land governance, and decentralise land registration processes provide avenues for strengthening women's tenure. By aligning such reforms with water sector planning, particularly in integrated catchment management plans like those being prepared in the Upper Nile WMZ, women can be better positioned to access resources, voice priorities, and sustain investments in groundwater-related innovations.

Enhanced tenure security for women can also foster more sustainable groundwater management by expanding access to financial services and technology adoption. With recognised land rights, women are more likely to secure credit and invest in technologies that improve water extraction efficiency, reduce physical water collection burdens, and support climate-adapted agriculture. These investments, in turn, can promote more equitable and diversified use of groundwater resources, increase productivity, and support broader socio-economic development goals.

### **3.2.4 Poverty among female-headed households — Implications for groundwater access & management**

Female-headed households (FHHs) in Uganda face unique socioeconomic vulnerabilities that directly affect their access to groundwater resources and participation in water governance. National data indicate that FHHs experience slightly higher multidimensional poverty rates than male-headed households, reflecting disparities in income, education, health, and living conditions (UBOS, 2023). These households often combine lower earnings, reduced land ownership, and higher care burdens, which cumulatively increase time spent on water collection and heighten susceptibility to water service disruptions (AfDB, 2022). In regions such as the Upper Nile WMZ groundwater serves as a crucial buffer against seasonal surface water scarcity. Yet, the constraints faced by FHHs limit their ability to benefit equitably from groundwater infrastructure and management initiatives.

- **Management Risks:** FHHs often experience multiple intersecting disadvantages: lower household income, limited land access, and significant domestic responsibilities. These factors restrict their ability to contribute to water service fees or participate in governance mechanisms such as borehole committees or water user associations. For example, in a typical Upper Nile WMZ village, borehole repair meetings may be scheduled during peak farm hours. Female heads, who are simultaneously responsible for water collection, childcare, and farm work, may not be able to attend, effectively reducing their voice in key decisions about maintenance and resource allocation (WaterAid, 2021). This exclusion represents a systemic management risk, as water infrastructure decisions may prioritize the needs of households headed by men, leaving the most vulnerable users underrepresented. Over time, this can exacerbate service inequities and undermine the sustainability of community-managed groundwater systems. Moreover, FHHs' limited

financial capacity makes them less resilient to service disruptions, increasing household vulnerability during droughts or pump breakdowns.

In addition, the higher poverty prevalence among FHHs reduces their ability to invest in household-level water improvements such as motorized pumps, storage tanks, or filtration systems. Lower access to financial services and credit further constrains technology adoption (UN Women, 2022). In the Upper Nile WMZ, where groundwater abstraction often requires upfront capital investment, these barriers mean FHHs may rely on distant communal wells, resulting in longer collection times, greater physical burden, and higher exposure to water quality risks (Cassivi et al, 2025; UNICEF and WHO, 2021).

These dynamics create a feedback loop: the poorer and more excluded households are, the less they can invest in resilience, and the more dependent they become on community-level maintenance decisions that they may not influence. Such risks can compromise overall groundwater management, as the needs of significant segments of the community are not reflected in maintenance priorities or resource allocation.

- **Opportunities:** Targeted strategies to include FHHs in groundwater governance can mitigate management risks and improve system sustainability. Approaches may include flexible scheduling of committee meetings, use of representative mechanisms that account for care and farm workloads, and capacity-building initiatives to strengthen the participation of FHHs in decision-making (Water for People, 2021). In the Upper Nile WMZ, such interventions can ensure that the priorities of households most reliant on groundwater, often women-headed, are adequately considered in maintenance planning, infrastructure placement, and allocation of resources.

In addition, programs that integrate income support, social protection, and microfinance for FHHs present opportunities to improve groundwater access while advancing gender equity. By increasing financial capacity, FHHs can contribute to community water funds, invest in household water technologies, and adopt small-scale irrigation systems that reduce collection burdens. Such interventions can enhance resilience to seasonal water scarcity, increase productivity, and foster equitable management of groundwater resources in the Upper Nile WMZ (UNDP, 2022).

Furthermore, recognizing FHHs as a distinct stakeholder group in groundwater planning allows for targeted subsidies or incentive schemes—for instance, conditional payments for borehole maintenance or groundwater recharge participation—that account for socio-

economic vulnerabilities. This approach ensures that FHHs benefit directly from water management interventions rather than being inadvertently excluded.

### **3.3 Gender and agricultural land & water uses**

Women's exclusion from irrigation investments is often a result of institutional and social norms. Irrigation schemes, whether small-scale motorised pumps or communal treadle pumps, are frequently brokered through male-headed households or farmer groups dominated by men (FAO, 2022). This limits women's direct access to groundwater resources for agricultural use, even when they are responsible for the majority of crop production.

For example, in a study conducted in northern Uganda, it was observed that male farmers controlled 80 percent of irrigation equipment, while women relied on rain-fed plots or manually carried water from wells and boreholes (World Bank, 2021). This inequity not only reduces productivity but also increases vulnerability to droughts, as women are unable to implement small-scale irrigation interventions that could stabilize yields and support household nutrition.

Another significant barrier is the limited participation of women in agricultural extension and water management programs. Extension services often target male-headed households or formal farmer groups, and training schedules frequently conflict with women's domestic and care responsibilities. In the Upper Nile WMZ, fewer than 30 percent of agricultural extension sessions explicitly target women farmers, and women report limited access to groundwater management information, such as borehole maintenance, irrigation scheduling, and aquifer recharge techniques (UN Women, 2022).

Without access to these services, women cannot optimize the use of groundwater for crop irrigation, and investments in small-scale pumps or drip irrigation systems may remain underutilized. The result is a gendered gap in agricultural productivity and climate resilience, despite women's substantial contribution to farm labour and household water management.

### **3.4 Gender, sanitation, and health**

Access to improved sanitation and hygiene facilities remains a critical challenge in Uganda. Nationally, only 72 percent of households have access to improved sanitation, and fewer than 50 percent have functional handwashing stations with soap and water (UBOS, 2023). Women and girls disproportionately bear the burden of managing sanitation needs, including menstrual hygiene management (MHM), and are primary water collectors in rural households. Evidence

indicates that women are responsible for 38 percent of water collection, with girls contributing 23 percent, often walking long distances to access safe water (WaterAid, 2022).

In the Upper Nile WMZ, where groundwater is a vital source of domestic and agricultural water, inadequate access to reliable water and functional sanitation facilities compounds unpaid care burdens for women, particularly in caring for sick household members afflicted by waterborne diseases (UNICEF, 2022). Women and girls often bear the primary responsibility for water collection and caregiving, and their workload and health risks are amplified when safe water and sanitation are limited. (Government of Uganda, 2025)

Furthermore, girls' school attendance is constrained by poor WASH conditions and inadequate menstrual hygiene facilities, leading to absenteeism during menstruation and, in some cases, school dropout. National analyses report that poor sanitation and water access negatively impact girls' education, with girls missing significant school days due to menstrual hygiene challenges in settings lacking supportive infrastructure (Right2Grow, 2023; UN Uganda, 2023).

In rural contexts like the Upper Nile WMZ, water scarcity or unreliable supply can increase dependence on contaminated sources, compounding public health risks that disproportionately affect women and girls through increased disease exposure and caregiving responsibilities.

### **3.5 Decision-making and empowerment**

Gender power dynamics in Uganda are strongly influenced by patriarchal norms, weak enforcement of gender-equitable legislation, and under-resourced gender institutions. Nationally, women's participation in governance is limited, with only about 30 percent of leadership positions in local government and natural resource management held by women, despite constitutional mandates for gender equity (MGLSD, 2022; UN Women, 2022). The Ministry of Gender, Labour, and Social Development (MGLSD), which is mandated to support gender mainstreaming, remains chronically underfunded, constraining its ability to build capacity and monitor gender outcomes across sectors, including water resources (MGLSD, 2022).

While national strategies call for gender-sensitive water resource committees and integration of women in water planning, capacity gaps persist. As a result, women's perspectives are often underrepresented in Water Management Zone planning and catchment committees, including in the Upper Nile WMZ, where decisions on groundwater infrastructure, borehole placement, and maintenance sequencing are traditionally dominated by men.

Without deliberate strategies to promote meaningful participation, women's representation in UNWMZ committees often remains symbolic rather than substantive. In many villages within the Upper Nile WMZ, meeting schedules coincide with farm or domestic responsibilities, and quorum rules may disadvantage women if their presence is required but unsupported by childcare or transport solutions (World Bank, 2021).

Such structural constraints carry direct implications for groundwater management. Decisions about repair sequencing, borehole locations, and allocation of water resources may fail to reflect women's priorities, such as proximity to household gardens, safe access points for water collection, or consideration of menstrual hygiene and caregiving responsibilities (UN Women, 2022). The result is a governance risk: groundwater investments may be underutilized or misaligned with community needs, disproportionately affecting women's welfare and household food security.

### **3.6 Summary of field visit discussions**

Based on the fieldtrip notes across the four communities, several common issues and themes emerge related to groundwater access, governance, equity, and climate impacts.

#### **3.6.1 Accessibility and Reliability Failures**

- **Source Reliance and Water Quality:** Communities primarily depend on boreholes, open wells, and spring wells. Due to high rates of borehole non-functionality, households frequently revert to unprotected open wells and spring sources that are shared with livestock. This exposes users to significant waterborne disease risks, including typhoid and diarrhoeal infections.
- **Facility Breakdown:** Boreholes experience frequent breakdowns driven by population pressure, ageing infrastructure, and consistently weak Operation and Maintenance (O&M) systems. Limited technical capacity and funds, delayed repairs, and insufficient availability of spare parts further contribute to prolonged non-functionality.
- **Time and Gender Burden:** Water collection responsibilities fall disproportionately on women and girls. When facilities fail, they must travel long distances—often 2–4 km—to alternative sources, increasing their physical workload and reducing time available for education, caregiving, and income-generating activities. Long travel distances also heighten exposure to risks of Sexual and Gender-Based Violence (SGBV).
- **Exclusion of Vulnerable Groups:** Persons with Disabilities (PWDs) face substantial barriers due to the absence of accessible design features at water sources, resulting in

high dependence on others and increased disease vulnerability. Elderly individuals struggle to use distant or physically demanding facilities, limiting their ability to access safe water.

- **Youth Vandalism:** Youth involvement in the theft or vandalism of borehole components—often sold for quick income—was widely reported. This directly contributes to borehole breakdown, increasing the community’s dependence on unsafe alternative water sources.

### **3.6.2 Water Governance and Financial Issues**

- **Gender and Decision-Making Power:** Although Water User Committees (WUCs) are structured to be gender-inclusive and women frequently serve as Treasurers, substantive decision-making authority remains largely male-dominated. Key decisions—including siting new boreholes, choosing technologies, and allocating maintenance budgets—are typically made by men, limiting women’s influence on issues directly affecting their water-collection burden.
- **Financial Exclusion and Transparency Gaps:** WUCs collect user fees of approximately UGX 1,000 per household per month for boreholes and UGX 500 for spring wells. Many low-income households cannot afford these contributions and therefore rely on unsafe open wells. Additionally, most committees lack formal financial management systems—such as bank accounts or documented expenditure records—raising concerns about transparency, accountability, and fund misappropriation.

### **3.6.3 Knowledge, Health, and Climate Context**

- **Unsafe Water-Handling Practices:** While community members report washing jerricans and storing water in clean pots, many do not boil water prior to consumption. This practice contributes to persistently high rates of waterborne disease, despite widespread awareness of typhoid outbreaks.
- **Climate Dependence and Household Vulnerability:** Livelihoods are heavily dependent on rainfed agriculture, making households acutely vulnerable to water scarcity. Reduced rainfall or prolonged dry spells directly affect crop yields, livestock health, household income, and food security. Most households lack irrigation technologies due to low financial capacity.
- **Perceived Climate Trends:** Residents noted that rainfall patterns were formerly reliable throughout the year but have become increasingly erratic. They attribute this to

anthropogenic pressures such as deforestation, mining, wetland encroachment, and broader environmental degradation.

- **Community Vision for the Future:** The community articulated a 10-year vision that prioritises household access to piped tap water, restoration of a green and healthy environment, and the construction of permanent housing. This reflects a strong demand for improved water security, environmental sustainability, and enhanced living standards.

## **4. Recommendations**

To address immediate groundwater challenges and institutionalise GESI principles in the Upper Nile WMZ, this assessment provides recommendations to the G4DR project. The most suitable way forward would be to implement a package of mutually reinforcing actions that strengthen groundwater infrastructure, governance, social inclusion, and climate resilience. The recommendations below align with field findings, national policy frameworks, and local socio-economic realities.

### **4.1 Strengthen Groundwater Governance and Community-Level System Management**

- **Build practical O&M capabilities within existing Water User Committees (WUCs)**
  - Provide targeted training for WUCs on preventive maintenance, record-keeping and simple troubleshooting for boreholes and handpumps
  - Develop a standardised, easy-to-use O&M checklist for WUCs that aligns with DWRM guidelines.
  - Introduce basic monitoring templates for capturing functionality status, breakdowns and repair times—data that can feed into the Upper Nile WMZ groundwater information products
- **Improve financial transparency of water fee systems using low-cost or non-digital tools**
  - Support WUCs to adopt simple financial ledgers and accountability practices (cashbooks, monthly reporting, making fee records publicly visible on noticeboards).
  - Assist WUCs to establish formal group-level bank accounts where feasible, in coordination with local government.
  - Integrate these practices into governance capacity-building

- **Enhance gender-responsive decision-making without creating complex new structures**
  - Develop short modules that help WUCs understand why women’s participation matters for groundwater decisions.
  - Promote meaningful roles for women beyond Treasurer positions—e.g., in borehole siting consultations, selection of monitoring points, and deciding maintenance priorities.

## **4.2. Improve Evidence on Groundwater Reliability, Access Constraints, and Social Inclusion**

- **Map seasonal reliability and access constraints of boreholes**
  - As part of groundwater assessment activities, integrate community-collected data on breakdown frequency, queue times, distance travelled, and alternative water sources used during downtime.
  - Combine hydrogeological mapping with social mapping: which villages revert to unsafe open wells when boreholes fail? Which groups (women, PWDs, elderly) experience the greatest barriers?
- **Document links between groundwater reliability, women’s unpaid care burdens and SGBV exposure**
  - Capture localized evidence—time lost, frequency of long-distance water trips, exposure to unsafe routes—and feed into district-level planning discussions.
  - Use this evidence to demonstrate the need for improved reliability rather than only expanded infrastructure.
- **Integrate disability-inclusive accessibility checks into groundwater monitoring activities**
  - When assessing or rehabilitating monitoring points, include a simple accessibility scoring (steps, height of apron, turning space, lifting force required).
  - Use the pilot results to refine national guidance for inclusive water point design (at policy level through AMCOW for example).

## **4.3 Support Low-Cost Behavioural and Health Risk Reduction Measures**

- **Strengthen safe water handling knowledge using existing local platforms**
  - Given G4DR is not a WASH service delivery project, the focus is on supporting partners to transmit accurate information:

- Train community focal persons and WUCs on basic safe water chain principles—clean storage, avoiding contamination during transport and use, and low-effort treatment options (e.g., filtration, solar disinfection) if boiling is not practiced.
- Integrate community feedback on waterborne disease trends into groundwater quality monitoring discussions.
- **Link groundwater quality monitoring to community awareness**
  - When quality issues (e.g., faecal contamination, turbidity, nitrate risk) are detected, share simplified explanations with WUCs and local leaders.
  - Develop one-page summaries showing what groundwater quality results mean for households, and how to reduce risk.

#### **4.4. Strengthen Climate Resilience Planning Using Community-Level Insights**

- **Integrate community perceptions of climate change into groundwater assessment products**
  - During catchment-level assessment for UNWMZ, incorporate community observations—reduced rainfall reliability, drying of shallow wells, effects on livestock and rainfed agriculture.
  - Use these insights to refine groundwater recharge assessments and identify priority zones for monitoring.
- **Promote practical, small-scale climate-resilient practices through knowledge exchange (not service delivery)**
  - Highlight examples of low-cost soil moisture conservation and smallholder water management that reduce pressure on unreliable groundwater points.
  - Ensure such content is fed into learning materials.

#### **5.5 Strengthen Youth Engagement and Reduce Vandalism Incentives**

- **Integrate local youth into the groundwater knowledge and monitoring activities**
  - Engage youth groups in basic data collection (mapping abandoned wells, recording breakdowns, documenting spare parts availability).
  - Support youth involvement in the G4DR Youth Forum and digital platforms to promote stewardship of groundwater assets.

- **Address vandalism through positive incentive structures rather than punitive measures**
  - Train interested youth in basic pump maintenance and create local “youth maintenance teams” where feasible.
  - Explore recognition-based incentives (certificates, public acknowledgement, linkages to district opportunities) to shift behaviour from vandalism to stewardship.

## **6. Use Field Findings to Inform National and Pan-African Policy Guidance**

- **Translate the Uganda pilot experience into actionable guidance for AMCOW**
  - Case note on gender barriers in groundwater access
  - Note on community-driven O&M good practices
  - Note on integrating groundwater evidence into catchment-level planning
- **Feed lessons into G4DR’s knowledge management system**
  - Develop short briefs on (for instance):
    - reliability challenges and gendered burdens
    - barriers for PWDs and elderly
    - youth vandalism drivers
    - community water quality practices

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