



The book brings together international contributors from medicine, public health, economics, law, political science, anthropology, environmental studies, urban planning, education, and civic governance to address the catastrophic situation in Sudan. Each chapter is grounded in original experience, empirical evidence, or sustained engagement with Sudanese institutions and communities. Together, they form both a documented record of collapse and a coordinated effort to imagine recovery and renewal.

The editors are Ahmed El Safi (a physician and President of the Sudanese Writers Union), Abdelbagi Ahmed (clinician and academic), and Gerard McCann (academic and international development policy adviser).

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Rebuilding Sudan After Catastrophe El Safi, Ahmed and McCann

SAANI

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State Collapse, National Recovery,
and the Architecture of Renewal



EDITED BY

AHMED EL SAFI, ABDELBAGI AHMED,
AND GERARD MCCANN

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ACKNOWLEDGEMENTS

This volume, *Rebuilding Sudan After Catastrophe: State Collapse, National Recovery, and the Architecture of Renewal*, is the outcome of an extraordinary collective effort undertaken under conditions of profound human tragedy, intellectual urgency, and moral responsibility. It was conceived not as a retrospective exercise alone, but as a forward-looking intervention, one that insists that even amid catastrophe, displacement, and state collapse, rigorous thinking, ethical clarity, and practical recovery architectures must not be deferred.

First and foremost, this book acknowledges the victims of the Sudanese war, those who were killed, those who were displaced, those whose lives were shattered, and those whose voices were silenced. Their suffering is not treated here as an abstraction or a statistic, but as the central moral axis around which this work revolves. We also acknowledge the courage of survivors and witnesses—inside Sudan and across the diaspora—who provided testimony, documentation, and lived knowledge, often at personal risk, to ensure that truth is preserved and denial is rendered impossible.

This volume brings together over twenty-five contributors—scholars, professionals, practitioners, and policy thinkers—from Sudan and the global Sudanese diaspora, as well as international colleagues who have stood in principled solidarity with Sudan's people. Each chapter reflects original experience, disciplinary depth, and a shared refusal to accept the false dichotomy between peace and justice, or between emergency response and long-term national recovery. The editors are deeply grateful to all contributors for their intellectual rigor, patience through multiple editorial passes, and commitment to a common framework while retaining the integrity of their individual voices.

Special acknowledgment is due to the Sudanese civil professionals, medical workers, educators, lawyers, engineers, economists, and community leaders—many operating under siege, displacement, or exile—whose ideas, initiatives, and field-based insights shaped the analytical core of this book. The Sudan National Recovery Framework (SNRF), the Smart Village Network (SVN), and the Sudan Recovery Arrangement (SRA) emerged not from abstract theorising but from decades of cumulative professional engagement with Sudan's structural vulnerabilities, social resilience, and unrealised potential.

The editors also acknowledge the foundational intellectual traditions that inform this work: Sudanese civic thought, medical and social ethics, indigenous knowledge systems, and comparative post-catastrophe recovery experiences from Africa and beyond. This volume stands on the shoulders of Sudanese scholars, reformers, and practitioners whose work was often marginalised, under-resourced, or interrupted by cycles of violence, yet whose insights remain indispensable to any serious recovery project.

We are indebted to colleagues, reviewers, and advisors who provided critical feedback at various stages of the manuscript, helping to strengthen its analytical coherence, evidentiary rigor, and policy relevance. Their engagement ensured that this book speaks simultaneously to scholars, policymakers, humanitarian actors, and Sudanese citizens seeking a credible pathway out of catastrophe.

This work also acknowledges the indispensable role of archives, documentation initiatives, and independent data collectors who preserved records of atrocities, population displacement, health system collapse, environmental destruction, and economic disintegration during the war. Without their efforts, the evidentiary foundation of this volume would not have been possible.

Finally, this book acknowledges the next generation of Sudanese youth, students, young professionals, and emerging civic leaders—inside Sudan and across the diaspora. It is written with them in mind. The architecture of renewal proposed here rests on the belief that recovery must be built from below, rooted in ethical citizenship, knowledge preservation, grassroots democracy, and the deliberate cultivation of a critical mass of informed, engaged, and morally anchored citizens.

This volume is offered not as a final word, but as a foundation: a documented record of atrocity, a framework for recovery, and an invitation to collective responsibility. If it contributes, even modestly, to ending impunity, restoring dignity, and enabling Sudan to re-imagine itself after genocide, then its purpose will have been fulfilled.

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ACRONYMS AND ABBREVIATIONS

The following acronyms and abbreviations are used throughout this volume. Terms are listed alphabetically.

<i>Acronym</i>	<i>Full Term</i>
ADS	Area Development Scheme(s)
AI	Artificial Intelligence
ARC	Administration of the Gezira Scheme
AU	African Union
DDT	Dichloro-Diphenyl-Trichloroethane
DSAI	Development Studies Association Ireland
DTM	Displacement Tracking Matrix
EBRD	European Bank for Reconstruction and Development
EIOS	Epidemic Intelligence from Open Sources
EOC	Emergency Operations Centre
EWARS	Early Warning, Alert and Response System
FAO	Food and Agriculture Organization
FCDO	Foreign, Commonwealth and Development Office (United Kingdom)
FFS	Farmer Field Schools
FGC	Female Genital Cutting
FPV	Floating Photovoltaics
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GERD	Grand Ethiopian Renaissance Dam

HCENR	Higher Council for Environment and Natural Resources
HDI	Human Development Index
HDP Nexus	Humanitarian–Development–Peace Nexus
HDPE	High-Density Polyethylene
HEEC	Health Emergency and Epidemic Control
HIPC	Heavily Indebted Poor Countries Initiative
IBS	Indicator-Based Surveillance
IDP	Internally Displaced Person
IDSr	Integrated Disease Surveillance and Response
IFIs	International Financial Institutions
IFPRI	International Food Policy Research Institute
IFRC	International Federation of Red Cross and Red Crescent Societies
IGAD	Intergovernmental Authority on Development
IHAS	Integrated Health Area System
IHR	International Health Regulations
IMT	Incident Management Team
IOM	International Organization for Migration
IPC	Integrated Food Security Phase Classification
IPM	Integrated Pest Management
LRCU	Locality Recovery Coordination Unit
MCH	Maternal and Child Health
MSVP	Minimum Smart Village Package
NPC	National Pesticides Council
NWQC	National Water Quality Commission
OCHA	Office for the Coordination of Humanitarian Affairs

OOP	Out-of-Pocket Expenditure
PAR	Photosynthetically Active Radiation
PFM	Public Financial Management
PHC	Primary Health Care
PLA	Participatory Learning and Action
POPs	Persistent Organic Pollutants
PRA	Participatory Rural Appraisal
QFFD	Qatar Fund for Development
R2P	Responsibility to Protect
RRA	Rapid Rural Appraisal
RRP	Regional Refugee Response Plan
RSF	Rapid Support Forces
SAF	Sudanese Armed Forces
SAPA	Sudanese American Physicians Association
SDGs	Sustainable Development Goals
SGB	Sudan Gezira Board
SMEs	Small and Medium Enterprises
SNCS	National Cyanotoxin Survey
SNRF	Sudan National Recovery Framework
SNRFA	Sudan National Recovery Framework Authority
SRA	Sudan Recovery Arrangement
SRCA	State Recovery Coordination Authority
SRFP	Sudan Recovery Financing Platform
SSMO	Sudanese Standards and Metrology Organisation
SVCI	Smart Village Composite Index
SVN	Smart Village Network

TDS	Total Dissolved Solids
UHC	Universal Health Coverage
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commissioner for Refugees
VKH	Village Knowledge Hub
VRC	Village Recovery Council
WHO	World Health Organization

INTRODUCTION

This book was written because waiting was no longer an ethical option.

Rebuilding Sudan After Catastrophe: State Collapse, National Recovery, and the Architecture of Renewal was conceived, developed, and completed amid an unfolding national catastrophe. It arises from a moment in which mass violence, forced displacement, institutional disintegration, and the systematic destruction of civilian life converged to produce not merely a political crisis, but a rupture in the moral and civic foundations of the Sudanese state. The events examined in this volume constitute catastrophes and state collapse. They demand clarity of language, integrity of analysis, and responsibility of response.

This is not a post-conflict book written with the comfort of hindsight, nor a neutral chronicle produced at a safe distance. It is a work developed during catastrophe, by scholars and professionals who have lived its consequences directly or through intimate proximity—inside Sudan and across its dispersed diaspora. It proceeds from the conviction that rigorous documentation, ethical judgment, and recovery architecture must be developed simultaneously, rather than postponed to an imagined “after” that may never arrive without deliberate intervention.

The central premise of this volume is uncompromising: the catastrophic war destroys more than lives; it dismantles the institutional, moral, and epistemic conditions necessary for recovery. Rebuilding cannot therefore be confined to ceasefire arrangements, humanitarian response, or technocratic reconstruction plans. It requires a conscious re-imagination of state, society, and citizenship, grounded in truth, accountability, and the deliberate restoration of public trust. This book rejects the false comfort of neutrality. It does not seek balance between perpetrator and victim, nor does it obscure responsibility behind the language of complexity. At the same time, it resists the reduction of Sudan’s catastrophe to a singular narrative of violence. The catastrophic war is treated here as a devastating rupture within longer historical trajectories of uneven development, distorted civil–military relations, regional marginalisation, environmental neglect, and repeated failures of governance. Understanding these trajectories is essential if recovery is to be more than temporary stabilisation.

The volume brings together contributors from medicine, public health, economics, law, political science, anthropology, environmental studies, urban planning, education, and civic governance. What unites them is not methodological uniformity, but ethical seriousness and practical relevance. Each chapter is grounded in original experience, empirical evidence, or sustained engagement with Sudanese institutions and communities. Together, they form both a documented record of collapse and a coordinated effort to imagine renewal.

A defining feature of this book is its integration of documentation with

design. Testimonies of survivors, statistical mapping of displacement and system collapse, and forensic analysis of atrocities are placed alongside frameworks for recovery, governance reform, and institutional reconstruction. This is a deliberate choice. Documentation without pathways risks becoming an archive of despair; architecture without truth risks reproducing the conditions that enable violence. Memory and future-building are therefore treated as inseparable, as are justice and development.

Three interlinked frameworks anchor the architecture of renewal advanced here: the Sudan National Recovery and Reconstruction Framework (SNRF), the Smart Village Network (SVN), and the Sudan Recovery Arrangement (SRA). These are not abstract models imported wholesale from external contexts. They are grounded in decades of Sudanese professional practice, comparative post-conflict learning, and sustained reflection on why previous transitions failed. Together, they propose a sequenced, bottom-up approach to recovery that prioritises primary health care, environmental rehabilitation, local governance, civic education, and the deliberate cultivation of a critical mass of informed citizens.

Central to this approach is the principle that recovery must begin from below. Large-scale political settlements, while necessary, are insufficient in isolation. Without functional local institutions, trusted service delivery, and participatory civic structures, national agreements remain fragile and vulnerable to capture. The Smart Village Network exemplifies this philosophy by treating villages and neighbourhoods not as passive recipients of aid, but as foundational units of recovery, sites where health, education, potable water, food security, environmental stewardship, and democratic practice intersect.

Health occupies a central place in this volume, not merely as a sector, but as a diagnostic lens for state failure and a cornerstone of recovery. The collapse of primary health care, the targeting of medical facilities, and the displacement of health professionals are examined as both humanitarian emergencies and indicators of deeper institutional decay. The One Health perspective advanced in several chapters reflects an understanding that human health, environmental sustainability, and social cohesion are inseparable in post-catastrophe contexts.

This book is intentionally interdisciplinary and demanding. Readers will encounter philosophical reflection alongside policy design, statistical analysis alongside oral testimony, and local case studies alongside international comparative frameworks. This hybridity reflects the reality of recovery itself, which cannot be confined to a single discipline. Rebuilding after catastrophe requires moral imagination as much as technical expertise, and civic courage as much as financial investment. The positionality of this work warrants explicit acknowledgement. The initiative to develop these frameworks and to convene this volume arose from Sudanese professionals and scholars with decades of experience working within, against, and alongside fragile institutions, often under conditions of repression or conflict. Their authority derives not only from academic credentials but from

lived engagement with Sudan's structural realities. International contributors participate in solidarity, not substitution, bringing comparative insight, external perspective, and shared responsibility.

Equally important is what this book does not claim. It is not a finished blueprint immune to revision, nor does it presume to speak for all Sudanese experiences or aspirations. It offers a documented foundation and a disciplined framework upon which broader civic, professional, and political engagement can build. Critique and adaptation are welcomed, but they must be grounded in truth and ethical commitment.

The decision to produce this volume in multiple formats and languages reflects its intended audience. It is written for scholars and policymakers, but also for Sudanese citizens, professionals, students, and members of the diaspora seeking a credible pathway out of catastrophe. Accessibility is treated here as an ethical obligation. Knowledge confined to elite circles cannot serve national recovery.

The emotional weight of this book should not be underestimated. Several chapters document atrocities, displacement, and institutional collapse in ways that are painful to read. This is unavoidable. Sanitising violence for reader comfort would be a further injustice to victims and survivors. Yet the volume is oriented toward agency rather than despair. Its underlying conviction is that recovery, while arduous and uncertain, remains possible if grounded in ethical clarity, institutional realism, and collective responsibility. This addresses the reader directly. Whether approached as scholarship, policy, or civic reflection, this book demands more than passive consumption. It asks difficult questions about responsibility—local and international, professional and civic. It challenges habits of postponement, fragmentation, and externally driven solutions. It insists that rebuilding after catastrophe is not solely a technical task, but a moral project that must be owned by those who inherit its consequences.

This book was written because silence had become complicity, and delay had become denial. It is offered in the hope that disciplined thinking, ethical courage, and collective action can still interrupt Sudan's trajectory of destruction and open a pathway toward renewal.

PART I

UNDERSTANDING THE CATASTROPHE: STATE COLLAPSE, VIOLENCE, AND NATIONAL FRAGMENTATION

CHAPTER 1

SUDAN'S CATASTROPHE: STATE COLLAPSE, WAR, AND FRAGMENTATION

Ahmed El Safi

Sudan's 2023 war represents far more than another cycle of political violence. It marks a profound rupture in the historical continuity of the Sudanese state itself. More than 25 million people now require humanitarian assistance, while over 12 million have been displaced from their homes (UN, 2023; UNHCR, 2024; IPC, 2024). Yet the destruction cannot be measured only through numbers, ruined buildings, or damaged infrastructure. Ministries have collapsed. Courts have ceased functioning across large areas. Universities, hospitals, municipal administrations, and professional systems that once sustained ordinary social life have fragmented or disappeared altogether. In many regions, the institutional presence of the state has retreated almost completely.

Sudan has experienced civil wars before. Darfur, the South, the East, and the Nuba Mountains all carry long histories of violence and marginalisation. The present catastrophe, however, differs in scale, speed, and depth. What is unfolding is not simply armed conflict but the accelerated disintegration of the structures that once connected society to the state.

This chapter is written within the broader intellectual framework of the Sudan National Recovery and Reconstruction Framework (SNRF). The SNRF approaches recovery not as a short transitional phase managed through emergency aid or elite political settlements, but as a long historical process through which legitimacy, public trust, and institutional life may gradually be rebuilt after mass atrocity and state collapse. Conventional reconstruction models usually assume that functioning ministries, bureaucracies, and administrative systems still exist in some usable form. In Sudan today, that assumption no longer holds across much of the country (De Waal, 2005; Scott, 1998; Mbembe, 2001).

For this reason, the argument developed here begins from a different premise. Recovery in Sudan cannot be engineered exclusively through centralised planning or negotiated over the heads of communities already carrying the burden of survival. In many parts of the country, society has endured precisely because local networks, kinship systems, informal authority structures, and village-level solidarities continued functioning long after formal institutions collapsed.

The chapter, therefore, explores recovery from below. It argues that reconstruction must emerge through everyday social life rather than merely through administrative decree. This approach reflects the SNRF emphasis on rebuilding legitimacy from the community upward (El Safi, 2025a).

Within this wider recovery vision, the Smart Village Network (SVN) is introduced as a practical framework through which these principles may take institutional form. The proposal does not emerge from abstract technological enthusiasm. It draws instead upon Sudan's earlier Primary Health Care (PHC) experience, indigenous systems of collective organisation, and lessons from post-conflict recovery elsewhere in Africa and beyond. Properly grounded, the SVN offers a means of stabilising populations, restoring essential services, rebuilding local governance, and gradually renewing the social contract through community participation rather than coercion (WHO, 1978; Ostrom, 1990; Kruk et al., 2018; El Safi, 2025b).

This chapter should therefore be read not as a self-contained development model, but as an opening operational layer within the larger architecture of the SNRF. Questions of constitutional authority, scaling, governance safeguards, and national coordination are developed fully in the later sections of the Framework devoted to grassroots democracy and the Smart Village Network itself.

Theoretical and Conceptual Foundations of the SNRF

Mass Atrocity Recovery and the Reconstitution of the Social Contract

Mass atrocity destroys more than lives. It corrodes the moral expectations that allow societies to function. Trust collapses. Public institutions lose credibility. Fear enters ordinary relationships. Communities become fragmented not only physically but also psychologically and ethically (Mamdani, 2001; Straus, 2015).

Recovery under such conditions cannot be reduced to rebuilding roads, ministries, or administrative systems alone. Three interconnected forms of security become essential. The first is human security: protection of life, health, shelter, and dignity. The second is institutional security: the restoration of predictable and accountable public authority. The third is moral security: rebuilding confidence between citizens, communities, and institutions after violence has shattered the social fabric (United Nations Human Rights Council, 2025).

The findings of the Independent International Fact-Finding Mission for the Sudan underline this reality. Accountability for crimes committed since April 2023 cannot be confined to legal prosecution alone. The process requires truth, reparations, institutional reform, and recognition of victims and survivors. Without these elements, impunity reproduces itself in new forms.

Experiences from Rwanda and Bosnia offer important lessons here. Durable recovery did not emerge solely from constitutional arrangements or national-level legal reforms. It depended equally upon localised spaces where communities could negotiate memory, justice, coexistence, and survival in practical terms (Clark, 2010). In Sudan, villages and local communities may once again become the primary arenas where social trust is slowly reconstructed.

African Political Thought and Village-Centred Renewal

The village occupies an important place within African political thought. Julius Nyerere viewed rural communal life not as a backward residue, but as the moral foundation of social responsibility and collective belonging (Nyerere, 1968). Ali Mazrui similarly described the African village as a site where ethical authority and political culture remained deeply intertwined (Mazrui, 1990).

Writers such as Ngũgĩ wa Thiong'o and Amílcar Cabral emphasised the importance of cultural rootedness in postcolonial recovery (Ngũgĩ, 1986; Cabral, 1973). Mbembe later argued that postcolonial futures require new relationships between territory, authority, and everyday life rather than the simple reproduction of inherited state structures (Mbembe, 2001).

These ideas resonate strongly with the Sudanese experience. For decades, rural Sudan functioned through overlapping systems of reciprocity, mediation, customary authority, and collective labour. Nafeer (ريفن), shura, communal harvesting, seasonal migration networks, and village dispute mechanisms were not marginal cultural remnants; they formed part of the practical infrastructure through which social life survived recurrent crises.

The SNRF builds upon this intellectual and historical inheritance. Villages are understood not merely as administrative units, but as living centres of governance, memory, production, and social continuity.

Sudan's Primary Health Care Legacy and Indigenous Governance Systems

Sudan's recovery does not begin from an empty landscape. During the 1970s and 1980s, Sudan developed one of the most ambitious Primary Health Care systems in Africa. Rural health assistants, community-based prevention strategies, vaccination campaigns, and village-level participation created a model that attracted international recognition (WHO, 1978; El Safi, 2025b).

Many Sudanese physicians who worked during that period still remember the practical realities of PHC outreach: long travel across difficult terrain, improvised clinics, vaccination campaigns conducted under trees or in village schools, and close relationships between health workers and local communities. The system was imperfect and under-resourced, but it created forms of trust and participation that remain deeply significant today.

Equally important are Sudan's indigenous governance traditions. Practices such as nafeer (ريفن), ajaweed (ديواج) mediation, and shura established culturally legitimate mechanisms for consultation, collective action, and conflict management. These traditions should not be romanticised. They carried exclusions and inequalities of their own. Yet they also embodied forms of local accountability often absent from externally imported governance models.

The challenge now is not to reproduce the past mechanically, nor to abandon it entirely in favour of imported institutional templates. Recovery

requires selective renewal: preserving socially legitimate practices while adapting them to contemporary realities.

The Smart Village Network as the Operational Core of the SNRF

The Smart Village Network represents an attempt to translate these historical and social realities into a practical recovery framework. Its purpose is not simply technological modernisation. Nor is it another externally designed rural development scheme detached from the political crisis of the Sudanese state. The SVN begins from a simpler observation: after widespread institutional collapse, recovery must start where people actually live.

In many parts of Sudan today, displaced populations are already reorganising survival through local mechanisms. Informal schools have appeared in villages and displacement sites. Community kitchens operate with minimal resources. Local health volunteers continue vaccination and emergency care despite extraordinary constraints. Women's groups, kinship networks, and neighbourhood committees frequently provide more continuity than formal authorities. The SVN seeks to strengthen and systematise these surviving capacities rather than replace them.

Primary Health Care as the Foundation of Human Security

Within each Smart Village, the PHC unit functions as the central institutional anchor. This role extends beyond clinical treatment alone. In post-atrocity settings, PHC often becomes one of the few remaining public structures capable of connecting communities to broader systems of protection and recovery. Maternal health services, vaccination, psychosocial care, communicable disease surveillance, nutritional support, and medico-legal documentation all become intertwined under conditions of social collapse (Kruk et al., 2018; WHO, 2023).

The importance of this should not be underestimated. In many Sudanese communities, the local clinic historically represented the most visible and trusted face of the state. Rebuilding such institutions therefore carries political and moral significance alongside medical value. Telemedicine and One Health approaches may help compensate for the destruction of tertiary facilities, especially in remote regions where war has devastated specialist care systems.

Education, Digital Literacy, and Civic Renewal

War destroys educational systems unevenly but deeply. Schools close. Teachers disappear. Universities fragment. Entire generations lose continuity in learning. Recovery must therefore treat education as more than technical training or workforce preparation. In societies emerging from mass violence, education also becomes part of moral reconstruction. It shapes citizenship, public reasoning, and social imagination (Fanon, 1961).

Within the Smart Village framework, education combines formal schooling with vocational training, digital literacy, local history, and civic participation. The aim is not merely to produce employable individuals, but to help rebuild the intellectual foundations of public life itself.

Governance, Smart Locality, and Decentralised Federalism

Centralised authority in Sudan has historically oscillated between fragility and coercion. Many peripheral communities experienced the state primarily through extraction, militarisation, or neglect rather than representation. The SNRF therefore argues for gradual decentralisation rooted in accountable local institutions. Each Smart Village would be governed through elected councils with participation from women, youth, and community representatives. Villages would then aggregate into Smart Localities capable of coordinating services, planning, and redistribution across wider areas.

This approach is not without risks. Local elites may capture institutions. Armed actors may interfere. Regional inequalities may deepen if decentralisation occurs without national safeguards. Sudan's political economy remains deeply shaped by war networks, patronage systems, and militarised resource control. Recovery must therefore balance decentralisation with national coherence and constitutional protection. Otherwise, fragmentation may simply reproduce itself under new administrative forms.

The Village Knowledge Hub

The Village Knowledge Hub (VKH) serves as the cognitive centre of the Smart Village framework. Located alongside the PHC unit, it links education, local data systems, environmental monitoring, communication technologies, and community archives. Its importance extends beyond information management. Sudan has suffered repeated forms of epistemic destruction: archives lost, institutions dismantled, professional memory dispersed through migration and war. Recovery requires rebuilding knowledge systems as carefully as physical infrastructure.

Village-level documentation, oral history projects, agricultural knowledge preservation, and local environmental monitoring may therefore become essential components of national reconstruction.

International and African Experiences Informing the SNRF

The SVN also draws lessons from wider African and international experience. Rwanda's local governance reforms, Ethiopia's community health systems,

Tanzanian village organisation experiments, Moroccan decentralisation efforts, and Kenyan digital innovation initiatives all demonstrate different possibilities for localised recovery and development. At the same time, Sudan's conditions remain distinct. No external model can simply be imported intact. Recovery frameworks succeed only when they resonate with existing social realities, institutional histories, and political cultures.

Post-Atrocity Recovery Functions of Smart Villages

Under conditions of mass displacement and institutional collapse, Smart Villages may serve several stabilising functions simultaneously. They can provide organised spaces for return and resettlement, support local justice and documentation processes, and reduce the likelihood of renewed violence through participatory governance and equitable resource management (IOM, 2023; Clark, 2010; Ostrom, 1990).

Yet recovery should not be romanticised. Villages themselves have also been sites of violence, exclusion, and political manipulation during Sudan's wars. Any village-centred recovery system must therefore remain attentive to local inequalities, gender relations, and unresolved grievances.

Institutional Pathway, Financing, and Risk Management

The SNRF proposes phased implementation extending from pilot villages toward broader national coordination between 2026 and 2040. Financing would necessarily combine public funding, donor support, diaspora engagement, private investment, and community participation.

The obstacles, however, are formidable. Sudan's war economy remains deeply entrenched. Armed actors control significant economic networks. Public trust in political authority is extremely weak. Donor fatigue is likely. External intervention may become fragmented or politicised. For these reasons, transparency, local participation, independent monitoring, and gradual implementation are essential. Recovery cannot succeed through slogans or externally imposed templates. It will require patience, institutional realism, and long-term social commitment.

Conclusion

The ideas presented in this chapter reach fuller institutional expression within the wider Sudan National Recovery and Reconstruction Framework, where the Smart Village Network is embedded within a broader system of constitutional governance and national recovery planning.

Sudan's catastrophe has shattered both state institutions and the social

fabric connecting communities to public authority. Recovery will not emerge solely through elite negotiations or centralised reconstruction programs. It must begin in the places where people continue to organise survival despite collapse: villages, neighbourhoods, local clinics, schools, and community networks.

The SNRF attempts to provide a framework through which those surviving social energies can gradually be transformed into a new architecture of recovery. Whether such a project succeeds will depend not only on funding or international support, but on the capacity of Sudanese society itself to rebuild trust, public life, and political belonging after one of the most devastating periods in its modern history.

Policy Box: Rebuilding Sudan from Below – Smart Village–Led Recovery

Post-catastrophe in Sudan must begin where society continues to function—within villages, local communities, and socially embedded systems capable of rebuilding governance, human security, and institutional legitimacy from below.

1. Position villages and local communities as the primary entry point for post-genocide recovery, recognising them as sites of governance, service delivery, and social contract reconstruction.
2. Adopt the Smart Village Network (SVN) as the core operational mechanism for implementing the Sudan National Recovery and Reconstruction Framework (SNRF) at the grassroots level.
3. Anchor recovery in Primary Health Care (PHC) as the institutional nucleus of human security, psychosocial repair, disease surveillance, and medico-legal documentation.
4. Integrate indigenous governance practices, civic participation, and local accountability mechanisms into elected village councils and Smart Localities.
5. Treat education, digital literacy, and knowledge hubs as instruments of citizenship reconstruction, not merely service provision.
6. Enable decentralised, polycentric governance that aggregates village-level authority into coherent national recovery structures without recentralisation.
7. Finance recovery through phased, multisource mechanisms combining public funds, donor support, diaspora engagement, and community contribution, with strong transparency safeguards.
8. Scale recovery incrementally from pilot Smart Villages to a nationally governed Smart Village Authority, ensuring legal protection, institutional continuity, and national integration.

Together, these principles establish a scalable recovery architecture in which Smart Villages function as operational nodes of national renewal, while the SNRF provides the governance, coordination, and resource systems necessary to sustain recovery, equity, and national cohesion.

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CHAPTER 2

DIGITAL WARFARE AND THE LOGIC OF MASS ATROCITY

Hind Abbas Hilmi Ibrahim

The war that erupted in Sudan on 15 April 2023 illustrates a defining feature of contemporary conflict: the extension of violence into digital space. This chapter examines how social media platforms functioned not merely as communication tools but as infrastructures that enabled dehumanisation, polarisation, and incitement consistent with genocidal dynamics (Howard, 2019; Zeitzoff, 2017). Drawing on a qualitative-dominant mixed-methods study, comprising analysis of 200 social media artefacts, twelve months of trend observation, and 30 key informant interviews, the chapter situates Sudan's digital conflict within the Sudan National Recovery and Reconstruction Framework (SNRF).

The analysis demonstrates that algorithmic amplification, coordinated disinformation, and the erosion of editorial gatekeeping weaponised identity narratives, accelerated violence, and contributed to the collapse of the social contract (Asgari and Zannettou, 2024; Monsted and Lehmann, 2024). At the same time, the study identifies forms of digital resistance, including humanitarian coordination, documentation, and peace advocacy. The chapter argues that post-genocide recovery requires recognising digital space as a core domain of governance, justice, and prevention. Within the SNRF, and operationalised through the Smart Village Network (SVN), digital peacebuilding emerges as a necessary component of dismantling the structural drivers of genocide and reducing the risk of recurrence.

Digital Space and the Contemporary Genocidal Condition

The catastrophe unfolding in Sudan constitutes one of the most severe humanitarian and genocidal crises of the early twenty-first century. Yet the violence did not arise solely from armed confrontation in cities or rural areas. It was preceded, accompanied, and intensified by sustained digital mobilisation (Owens and Bailey, 2021; Slom, 2025). As articulated in the Framework, the conflict reflects the culmination of long-standing structural drivers, including political exclusion, racialised governance, institutional decay, and predatory political economies. In the contemporary information environment, these drivers were amplified through social media systems (Howard, 2019).

Genocide scholarship has long emphasised that mass violence is preceded by cognitive and moral preparation. Stanton's (2013) genocidal continuum—classification, symbolisation, dehumanisation, organisation, polarisation, preparation, persecution, extermination, and denial—offers a useful analytical

lens. In Sudan, social media platforms compressed these stages, enabling the rapid circulation of hate speech, atrocity narratives, and identity-based incitement (Benesch, 2020; Perry and Olsson, 2009). Digital space thus operated as a site where enemies were constructed, moral constraints weakened, and violence normalised.

This chapter examines the dual role of digital platforms during the Sudanese conflict. It analyses how social media amplified structural drivers of violence while also documenting how digital tools were repurposed for survival, resistance, and humanitarian action. It then situates these findings within the SNRF, arguing that recovery frameworks that neglect the digital domain risk leaving intact the cognitive infrastructures that enabled mass violence.

Analytical Framework

There is a need to integrate insights from genocide studies, media theory, and political sociology to analyse the relationship between digital platforms and mass violence. Social Identity Theory (Tajfel and Turner, 1979; Huddy, 2001) explains how individuals derive meaning from group affiliation, producing rigid in-group and out-group boundaries. In Sudan's polarised environment, algorithmic curation reinforced these divisions, portraying political and ethnic 'others' as existential threats (Wang and Yan, 2020).

This dynamic was reinforced by the Spiral of Silence (Noelle-Neumann, 1974; Gearhart and Zhang, 2014), as individuals withdrew dissenting views under conditions of intimidation and fear, thereby strengthening dominant extremist narratives. Media Ecology Theory (McLuhan, 1964; Postman, 1970) clarifies how platform design shapes communicative environments. Engagement-driven algorithms privileged emotionally charged material, amplifying fear and outrage while marginalising nuance (Asgari and Zannettou, 2024). From the SNRF perspective, this constitutes an institutional failure in the digital domain, undermining cognitive security and social trust. Agenda-setting and framing theory further illuminate these processes (McCombs and Shaw, 1972; Entman, 1993; De Vreese, 2005). Competing armed actors actively framed the conflict in existential and zero-sum terms, while digital virality prioritised polarising narratives.

Critical Discourse Analysis (Fairclough, 1989; Van Dijk, 2001) reveals that hate speech functioned as a structured discursive practice rather than spontaneous expression. Dehumanising metaphors and narratives were deployed systematically to normalise exclusion and reduce psychological barriers to violence. Finally, diffusion theory (Rogers, 2003; Valente and Rogers, 1995) helps explain how inflammatory narratives spread rapidly across networks, particularly when promoted by influential digital nodes.

Mechanisms of Digital Violence

Several mechanisms through which social media facilitated violence were identified:

- First, the erosion of editorial gatekeeping enabled unverified content, manipulated images, and graphic material to circulate at speed (Silverman and Johnson, 2020). Influential accounts accrued large audiences without accountability, while fact-checking initiatives were unable to keep pace (UNESCO, 2021).
- Second, competing armed actors pursued aggressive narrative strategies that framed the conflict in existential terms (Asad, 2021; Al Zahra, 2023). Such digital agenda-setting extended state collapse into epistemic space, eroding shared reality and complicating accountability (Howard, 2019).
- Third, the viral circulation of atrocity imagery mobilised emotion and identity. While documentation remains essential for justice, unmediated dissemination often inflamed sentiment rather than facilitating deliberation (Stear, McCabe and McCarty, 2023). This highlights the ethical ambiguity of digital witnessing in genocidal contexts.
- Fourth, the globalisation of hate through digital networks intensified polarisation (Perry and Olsson, 2009; Siapera et al., 2018). Online racism and identity-based hostility became normalised within echo chambers, accelerating conflict dynamics.
- Bandura's (1977) theory of moral disengagement further clarifies how repeated exposure to dehumanising narratives reduces empathy and weakens moral restraints against violence.

Hate Speech and the Normalisation of Atrocity

- The study documents a distinctive lexicon of online dehumanisation, including metaphors that reduce victims to animals or consumable matter. Such language is a well-established genocidal mechanism (Stanton, 2013; Benesch, 2020). Notably, these narratives extended beyond fringe platforms into mainstream media and influencer spaces, signalling the normalisation of genocidal logic.

UNESCO (2015; 2021) emphasises that unchecked online hate speech erodes democratic norms and heightens risks of physical violence. In Sudan, hate speech intensified internal fragmentation within armed groups, contributing to tribalisation and internal purges. These dynamics complicate future demobilisation, reconciliation, and institutional reintegration.

Digital Mobilisation and the War Economy

Encrypted messaging platforms facilitated recruitment, coordination, and logistics, lowering the cost of violence and blurring civilian–combatant boundaries (Owens and Bailey, 2021). Digital infrastructures thus became embedded in the war economy.

At the same time, digital tools enabled grassroots humanitarian initiatives,

including decentralised food distribution networks that operated across identity lines. These practices illustrate the ambivalence of digital systems: technology itself is not determinative. Outcomes depend on governance, norms, and institutional embedding (Howard, 2019).

External Actors and Information Geopolitics

Sudan's digital conflict unfolded within a transnational information environment. Diaspora engagement amplified awareness but also transmitted unresolved grievances (Slom, 2025). Foreign disinformation campaigns further distorted narratives, complicating accountability and peacebuilding (Zeitsoff, 2017). The SNRF recognises these dynamics, emphasising nationally grounded yet internationally coordinated information governance strategies.

Digital Peacebuilding

The SNRF asserts that recovery must begin under conditions of conflict rather than await its conclusion. Digital space must therefore be treated as a core domain of recovery architecture. Within the Smart Village Network, community-managed digital hubs provide access to verified information, digital literacy training, and peer accountability. Anchoring connectivity in physical community space counters anonymity-driven hate and supports the restoration of civic norms.

Digital literacy is reframed as a component of human and cognitive security (Silverman and Johnson, 2020). Training citizens—particularly youth—to recognise disinformation and hate speech constitutes a preventive investment aligned with preparedness logic. Linguistic observatories enable systematic monitoring of hate discourse (Van Dijk, 2001). Digital archives transform social media content into structured repositories for memory and transitional justice.

Conclusion

Digital warfare in Sudan functioned both as an accelerant of genocide and as a contested space of resistance. This chapter demonstrates that addressing the digital architecture of violence is essential to dismantling the structural drivers of atrocity.

Within the Sudan National Recovery and Reconstruction Framework, and operationalised through the Smart Village Network, digital peacebuilding emerges as a core pillar of recovery, justice, and non-recurrence. Recovery efforts that fail to engage the digital domain risk leaving intact the cognitive conditions that enabled genocide.

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PART II
POLITICAL ECONOMY, GOVERNANCE, AND
STATE RECONSTRUCTION

CHAPTER 3

NATURAL RESOURCE GOVERNANCE, LAND DEGRADATION, AND SUSTAINABLE RECOVERY IN SUDAN

Hashim Mohamed El Hassan

As a point of entry to this chapter, it is essential to clarify a number of technical terms that are central to understanding the dynamics of land degradation, natural resource governance, and sustainable recovery in Sudan. These concepts form the analytical foundation upon which the chapter's argument is constructed and are indispensable for interpreting both the historical analysis and the policy recommendations that follow. The key technical terms addressed here include desertification, land degradation, deforestation, reforestation, and afforestation.

According to the United Nations Convention to Combat Desertification (UNCCD), desertification and land degradation are defined as follows:

“Desertification means land degradation in arid, semi-arid, and dry sub-humid areas resulting from various factors, including climatic variations and human activities.” (UN Secretariat, 1994) ... “Land degradation means reduction or loss, in arid, semi-arid, and dry sub-humid areas, of the biological or economic productivity and complexity of rain-fed cropland, irrigated cropland, or range, pasture, forest and woodlands, resulting from land uses or from a process or combination of processes, including those arising from human activities and habitation patterns.” (UN Secretariat, 1994)

These processes include: soil erosion caused by wind and/or water; deterioration of the physical, chemical, biological, or economic properties of soils; and long-term loss of natural vegetation (UN Secretariat, 1994).

In relation to forest resources, the Food and Agriculture Organization (FAO) provides internationally accepted definitions that further refine the analytical framework of this chapter. According to the *Global Forest Resources Assessment* analysis:

- Deforestation refers to “the conversion of forest to another land use, or a long-term reduction of tree canopy cover below 10 per cent” (FAO, 2020).
- Reforestation is defined as “the re-establishment of forest after a temporary period (less than ten years) of low canopy cover due to disturbances” (FAO, 2020).
- Afforestation refers to “the conversion of land that was previously not forest into forest, or an increase in canopy cover to above 10 per cent” (FAO, 2020).

Within this framework, efforts to combat desertification are directed toward three interrelated objectives:

1. the prevention and/or reduction of land degradation;
2. the rehabilitation of degraded land; and
3. the reclamation of desertified land (UN Secretariat, 1994).

Early scholarly concern with desert expansion in Sudan dates back to Stebbing's seminal description of what he termed the "*creeping desert*". Stebbing (1953) defined this phenomenon as the gradual southward expansion of desert conditions into the Sahelian belt, including northern Sudan, driven by both environmental pressures and human activity.

Subsequent research has emphasised the interaction between climatic stress and anthropogenic factors in accelerating land degradation in drylands. Abdei et al. (2013) highlighted drought as a critical limiting factor for biomass production and crop yields in arid and semi-arid regions, while stressing that human-induced pressures—such as over-cultivation, overgrazing, and inappropriate land-use practices—can transform climatic vulnerability into irreversible environmental degradation. When these practices occur under dryland conditions, they frequently result in vegetation loss, soil nutrient depletion, and, ultimately, desertification (Abdei et al., 2013). Ayoub (1998) identified four principal drivers of land degradation in Sudan, summarised in Table 1.

Table 1. Causes of land degradation in Sudan

Cause	Percentage (%)
Overgrazing	47
Mechanised farming and irrational cultural practices	22
Tree cutting for charcoal and fuelwood	19
Intensive use of wood for other purposes	12
Total	100

Source: Ayoub (1998).

Official internal reports from the Department of Soil Conservation and Combating Desertification at the Ministry of Agriculture and Forests further indicate the geographical scale of the problem. Out of Sudan's eighteen states, fifteen are classified as affected by desertification. Among these, three states—Red Sea, North Darfur, and North Kordofan—are considered severely affected.

The remaining three states identified as relatively unaffected are Blue Nile, South Darfur, and South Kordofan. Against this background, the objectives of this chapter are fourfold:

- To draw the attention of future national planners to the necessity of reliable and comprehensive data as a prerequisite for rational land-use planning;
- To emphasise the need for a scientific approach to rain-fed agriculture;
- To argue for a reduction in farm size to create space for reforestation and land rehabilitation; and
- To remind policymakers of the importance of managing natural resources on a sustainable basis to safeguard the livelihoods of present and future generations.

The Political Context of Natural Resources Management

To understand the current state of natural resources management in Sudan, it is necessary to situate it within its historical and political context. The institutional foundations of natural resource governance were largely laid during the colonial period, and subsequent post-independence trajectories cannot be fully understood without reference to this legacy.

During the colonial era, the administration established a relatively coherent and technically grounded system for managing natural resources. Two core departments were created: the Department of Agriculture and the Department of Forests. In addition, a rangeland section was established under the Department of Animal Resources, and a Soil Conservation Committee was formed to oversee land-use sustainability. These institutional arrangements reflected a recognition of the interdependence between agriculture, forestry, rangelands, and soil conservation.

A defining feature of colonial governance was the devolution of authority to traditional leaders under the system of so-called “indirect rule”. This approach aimed to reduce administrative costs in remote areas while securing the cooperation of tribal leadership. Crucially, this devolution was supported by appropriate legislation that enabled native administrations to regulate land use, grazing patterns, and forest protection within their territories. In practice, this system proved relatively effective, particularly in safeguarding rangelands and forest reserves. In his assessment of grazing systems in Sudan, Harrison (1955) observed that natural resources were comparatively abundant at the time, a view later reinforced in the ecological classification of Sudan’s vegetation (Harrison and Jackson, 1958).

This situation was attributed to two main factors. First, natural ecological checks limited livestock numbers to levels broadly compatible with the carrying capacity of rangelands. Second, demand for charcoal and fuelwood—the primary sources of domestic energy at the time—remained relatively low due to limited

urbanisation. As a result, competition over natural resources was minimal, and conflicts between pastoralists and farmers were largely absent (Harrison, 1955).

Following independence, successive national governments sought to expand state revenues in order to finance development objectives. Agriculture was identified as the primary engine of economic growth. This orientation was strongly influenced by earlier colonial thinking, most notably Tothill's assertion that "the future of the Sudan, as far as can be predicted, must lie in agriculture" (Tothill, 1948). While this proposition proved valid in permanently irrigated schemes, its uncritical extension to rain-fed areas produced far more ambiguous outcomes.

In rain-fed regions, the absence of adequate and reliable ecological, agronomic, and socio-economic data made meaningful planning extremely difficult. Traditional rain-fed agriculture and pastoral livelihoods were largely treated by national planners as marginal or residual activities, falling outside the central concerns of state policy. Consequently, vast areas of rain-fed land remained poorly understood and weakly governed.

Despite this knowledge gap, a decisive policy shift occurred in 1967 when a national government elected to convert extensive forestlands in southern Gedaref into mechanised rain-fed agricultural schemes. To operationalise this strategy, the Mechanized Farming Corporation (MFC) was established and tasked with promoting large-scale rain-fed agriculture. Under this scheme, private investors were allocated farms of approximately 1,000 feddans (420.17 hectares) each, and the Agricultural Bank facilitated the importation of mechanised equipment.

Initial success in sorghum production encouraged rapid expansion. As profitable seasons accumulated, investors encroached upon remaining forestlands beyond officially demarcated areas. These encroachments were initially described by the MFC as "undemarcated farms". Rather than being curtailed, they were retrospectively legalised in 2006 through official recognition as demarcated farms. This process marked a critical failure of land-use governance and regulatory enforcement. The ecological consequences of mechanised farming expansion in Gedaref have been widely documented (Elhadary, 2014).

Institutionally, post-independence governments largely replicated the colonial administrative structure by merging agriculture and forestry under a single ministry, while assigning rangeland and pasture to the Ministry of Animal Resources. An important exception occurred during the presidency of Jaafar Nimeiri, when a Ministry of Agriculture and Natural Resources was established. Under this arrangement, an Undersecretary for Natural Resources was appointed with responsibility for forests, rangelands, wildlife, and soil conservation. This represented a forward-looking attempt to integrate natural resource management within a unified policy framework.

However, this institutional innovation was short-lived. Political resistance and entrenched bureaucratic interests—often described as the "deep state"—ultimately dismantled the arrangement. The result was a persistent structural

defect characterized by fragmentation and weak coordination among natural resource institutions.

At present, the institutional configuration of natural resource management in Sudan can be summarised as follows:

- The Department of Forests has been elevated to the status of a corporation, in contravention of established Ministry of Finance and Economic Planning criteria for the creation of public corporations;
- The Department of Rangeland and Pasture operates as a full general directorate under the Ministry of Animal Resources;
- The Department of Wildlife has been transferred to the Ministry of Interior; and
- The Department of Soil Conservation and Land Use remains within the Ministry of Agriculture and Forests, now renamed the Department of Soil Conservation and Combating Desertification.

This fragmented arrangement has significantly weakened natural resource governance. Instead of functioning as an integrated system, the various components of natural resources management now operate in isolation, undermining strategic planning and accountability (Hardin, 1968). The consequences of this institutional defect are illustrated by land allocation patterns in Gedaref State, as shown in Table 2.

Table 2. An example of bias in the allocation of land resources in Gedaref State

Season	1941		2002	
Type of land	Area (km ²)	%	Area (km ²)	%
Mechanized farming	3,150	8.7	26,000	72.2
Forests and rangelands	28,250	78.5	6,700	18.6
Hills and water courses	3,300	9.2	2,000	5.6
Wasted land	1,300	2.6	1,300	3.6
Total	36,000	100.0	36,000	100.0

Source: Ministry of Finance, Gedaref State (2002).

This distorted allocation reflects a policy environment in which state governors have repeatedly authorised the conversion of reserved forests into agricultural schemes. Such actions have deprived society of critical ecosystem services provided by forests, including oxygen production, carbon sequestration, biodiversity conservation, wildlife habitat, and long-term land reserves for future use.

Conclusion

The cumulative impact of institutional fragmentation has been severe. Overgrazing, deforestation, and unsustainable land conversion have accelerated land degradation and desertification, undermining rural livelihoods and intensifying competition over shrinking natural resources. In many areas, this competition has escalated into violent conflict between pastoralists and farmers, resulting in displacement and social fragmentation.

To reverse these trends, the existing institutional arrangement within the Ministry of Agriculture and Forests must be fundamentally reformed. A new governance vision is required—one capable of restoring coordination across natural resource sectors, rehabilitating degraded land, and ensuring that natural resources are transferred to future generations in a more productive and sustainable condition. It is deeply regrettable that, in comparative historical terms, the most coherent phase of natural resource management in Sudan occurred during the colonial period.

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CHAPTER 4

BETWEEN INTERNATIONAL RESPONSIBILITY AND NATIONAL OWNERSHIP

Tarig Abusalih

Sudan faces one of the gravest humanitarian and political crises of the early twenty-first century, with genocide against civilian populations and the collapse of state institutions generating widespread displacement, violence, and institutional fragility. International engagement has been essential, yet fragmented, constrained by political, financial, and operational challenges. This chapter examines how multilateral institutions, bilateral donors, and international financial institutions can support Sudan's recovery, justice, and reconstruction through the nationally owned Sudan National Recovery and Reconstruction Framework (SNRF).

Anchoring engagement in the SNRF enables principled, phased, and accountable recovery financing, strengthens institutions, embeds justice and reconciliation, and transforms short-term humanitarian assistance into sustainable reconstruction. Strategic shifts are recommended, including aligning funding with national priorities, integrating justice benchmarks, empowering civic actors, improving coordination, and adopting risk-tolerant approaches. By linking international responsibility with national ownership, Sudan's recovery can move from emergency response to durable peace and reconstruction.

Genocide, State Collapse, and the International Moment

Sudan continues to confront a complex and interrelated array of challenges as it grapples with the impacts of prolonged conflict and deep political crisis. Since the outbreak of war between the Sudanese Armed Forces (SAF) and the Rapid Support Forces (RSF) on 15 April 2023, the country has experienced not only widespread destruction of infrastructure and public services, but also the deliberate targeting of livelihoods, the burning of archives, and the looting of invaluable cultural heritage. At the same time, large-scale and systematic atrocities—including acts of genocide and widespread sexual violence—have been committed by the Rapid Support Forces and allied militias against civilian populations in Darfur and other parts of Sudan.

These crimes, marked by the intentional targeting of specific ethnic groups, constitute one of the gravest humanitarian, political, and moral crises of the early twenty-first century. The descent into genocide and protracted armed conflict has produced catastrophic consequences: an estimated 15 million Sudanese have been uprooted—approximately 10 million internally displaced and more than 4 million fleeing and seeking refuge across borders—creating what is widely

regarded as the world's largest displacement crisis. Entire communities have been deliberately targeted, while the institutional foundations of the state have been severely eroded. This catastrophe unfolded as a consequence of entrenched authoritarian governance, a heavily militarised political economy, and the gradual erosion of institutions responsible for law, social welfare, knowledge, and public accountability (IOM, 2026).

The systematic nature of the violence, combined with identity-based targeting and the collapse of core governance structures, clearly situates Sudan within a mass-atrocity context. One of the most profound consequences of this trajectory has been the severe erosion of social cohesion across the country. These dynamics demand responses that go far beyond conventional emergency humanitarian relief, encompassing justice and accountability, transitional processes, institutional rebuilding, and long-term national recovery and reconstruction (United Nations, 2025).

International engagement in Sudan has expanded significantly in response to the crisis. Multilateral organisations, bilateral state actors, international financial institutions (IFIs), and humanitarian agencies have mobilised financial, technical, and diplomatic resources, seeking to address both immediate humanitarian needs and longer-term recovery challenges. Yet this engagement unfolds in a highly complex and contested environment, characterised by fragmented authority, ongoing conflict, pervasive insecurity, and widespread erosion of public trust—both domestically and internationally. In this context, the central question is not whether international engagement is necessary, but how it can be structured to support Sudanese-led recovery without reproducing dependency, legitimising impunity, or displacing national agency (OECD, 2022; United Nations, 2023).

The challenges of international intervention in Sudan are compounded by several factors: the limited capacity of central authorities to exercise full governance, particularly given the formation of a parallel administration in areas controlled by the Rapid Support Forces; the persistence of armed actors controlling key territories; and the fragmentation of civil society institutions that traditionally mediate between communities and the state. International actors also operate under political, financial, and institutional constraints, including conditionalities tied to donor priorities, risk-averse approaches by IFIs, and the need to navigate competing geopolitical interests. These constraints often result in short-term, fragmented interventions that fail to reinforce long-term institutional capacity or sustain recovery trajectories.

Against this backdrop, the Sudan National Recovery and Reconstruction Framework (SNRF) provides a strategically coherent, nationally anchored pathway for recovery. SNRF is a strategic approach designed to transition Sudan from a humanitarian crisis to sustainable development. It focuses on rebuilding damaged infrastructure, restoring basic services, fostering economic recovery, and strengthening community resilience against natural hazards and conflicts. By integrating humanitarian relief, justice, institutional rebuilding, and socio-

economic development into a phased and principled framework, the SNRF offers a blueprint through which international actors can align resources, ensure accountability, and support Sudanese-led reconstruction efforts. Crucially, the SNRF emphasises justice, social cohesion, and civic participation as core elements of recovery, ensuring that reconstruction is not only technically effective but also ethically grounded and politically legitimate.

The United Nations Interim Cooperation Framework 2026–2028 for Sudan (ICF) is structured around four Strategic Priorities, identified through a cumulative consultative process involving national authorities, non-governmental organisations (NGOs), and civil society organisations (CSOs), including women- and youth-led groups:

- Restoration of inclusive essential services – Ensuring access to health, education, water, and other critical services for all communities, particularly the most vulnerable.
- Socioeconomic recovery, resilient livelihoods, and food security – Supporting economic revitalisation, sustainable employment, and access to sufficient, nutritious food.
- Peace, justice, and strong institutions – Strengthening governance, the rule of law, and social cohesion to foster lasting stability.
- Environment, climate action, and disaster resilience – Promoting sustainable resource management, climate adaptation, and preparedness for natural and human-made disasters.

These strategic priorities were informed by and are aligned to the Government of Sudan’s ‘Economic Vision for the Post-war period, Reconstruction, and Compensation 2025–2028’ (United Nations, 2026).

The international architecture shaping Sudan’s recovery is here examined, with a focus on how multilateral institutions, bilateral donors, and IFIs can be strategically mobilised in alignment with the SNRF. It highlights the opportunities and constraints of international engagement, the ethical and political imperatives of justice and sovereignty, and the policy pathways necessary to transition from reactive crisis response to sustainable, nationally owned recovery. By situating recovery within both the global normative framework of atrocity prevention and the locally grounded priorities of Sudanese communities, this analysis aims to provide a pragmatic, policy-oriented guide for donors, international agencies, and Sudanese stakeholders alike.

The International Architecture of Recovery: Actors and Instruments

International engagement in Sudan operates through a complex and often fragmented architecture composed of multilateral institutions, bilateral state actors, humanitarian agencies, and development financiers. Each actor brings distinct mandates, incentives, and limitations (Paris, 2004).

The United Nations system—including the UN Secretariat, its humanitarian bodies, and specialised agencies—plays a pivotal role in coordinating humanitarian response and supporting early recovery efforts in Sudan. Through mechanisms such as the Humanitarian Country Team and inter-cluster coordination led by the Office for the Coordination of Humanitarian Affairs (OCHA), the UN provides a framework for mobilising international assistance, aligning donor efforts, and delivering life-saving aid in a highly complex operating environment. Agencies such as UNICEF and UNHCR focus on emergency health, nutrition, education, child protection, and refugee and internally displaced persons (IDP) protection, while UNDP and related entities engage in early recovery initiatives, including livelihoods support, basic service restoration, and community-level resilience programming.

Despite this central role, the UN system in Sudan faces structural and operational constraints that limit its ability to address the deeper political economy drivers of conflict, displacement, and state fragility. A longstanding institutional separation between humanitarian relief and development assistance—reflected in distinct funding streams, mandates, planning cycles, and accountability frameworks—has resulted in fragmented interventions. Humanitarian programming is primarily designed to alleviate immediate suffering and save lives, often operating on short-term funding horizons, while development actors are constrained in their ability to engage meaningfully in governance reform, institutional rebuilding, and conflict prevention in the absence of stable political conditions. This divide weakens the system's capacity to move beyond crisis management toward addressing the root causes of violence and chronic displacement.

In the Sudanese context, these systemic limitations are further intensified by acute insecurity and access constraints. Ongoing hostilities, attacks on civilians and humanitarian personnel, bureaucratic impediments imposed by conflict parties, and the fragmentation of territorial control severely restrict the reach and effectiveness of UN operations. In many areas, humanitarian access is intermittent, unpredictable, or entirely denied, undermining needs assessments, monitoring, and sustained program delivery. These conditions also constrain the ability of development-oriented agencies to design and implement longer-term recovery and institution-building interventions. (OCHA, 2025; United Nations, 2025).

Compounding these challenges is the absence of a unified national authority capable of providing strategic direction, coordination, and oversight. Without a functioning central government or credible counterpart institutions, the UN system is forced to operate in a substitute or parallel manner, assuming roles that would normally be led by the state. While this has enabled the continuation of essential assistance, it has also limited prospects for national ownership, policy coherence, and sustainability. In effect, the UN's response in Sudan is shaped not only by the scale of humanitarian need but also by structural constraints within the international system itself and by the profound erosion of state authority, both of which impede a transition from emergency relief to durable recovery and peacebuilding.

The participation of the European Bank for Reconstruction and Development (EBRD) and UN-Habitat in Sudan's post-war reconstruction is critical to transforming the immense challenges of rebuilding into opportunities for sustainable and inclusive development. By leveraging their expertise in infrastructure financing, urban planning, and governance, these institutions can help lay the foundations for resilient cities, revitalised economic hubs, and strengthened institutional capacity. Their engagement can also promote integrated approaches that link immediate reconstruction needs with long-term social, economic, and environmental objectives, ensuring that recovery efforts contribute not only to stability but also to sustainable growth.

International Financial Institutions (IFIs)—including the World Bank, IMF, and regional development banks such as the African Development Bank and the Arab Fund for Economic and Social Development—possess significant potential leverage in post-conflict reconstruction and macroeconomic stabilisation. In practice, however, their engagement has been severely constrained by political conditionality, arrears and debt distress, sanctions legacies, disputes over the recognition of a sovereign counterpart, and heightened institutional risk aversion. Consequently, IFI involvement has remained largely technical and preparatory, reinforcing a pattern in which short-term humanitarian assistance substitutes for structured recovery financing rather than enabling it (World Bank, 2020).

This risk-averse posture, while institutionally understandable, has contributed to the persistence of parallel aid systems that bypass national institutions, delay macroeconomic stabilisation, and weaken prospects for long-term recovery. Anchoring IFI engagement within the Sudan National Recovery and Reconstruction Framework (SNRF) provides a credible, principled pathway to overcome these constraints. By offering a nationally articulated, phased, and accountable framework, the SNRF enables responsible recovery financing even amid political uncertainty. For donor governments and IFI shareholders, this approach allows engagement that simultaneously supports institutional rebuilding, stabilises the macroeconomy, and safeguards national ownership, without conferring legitimacy on impunity or displacing Sudanese agency.

Ultimately, SNRF-aligned IFI engagement transforms technical interventions into strategic, accountable, and sustainable financing, bridging the gap between emergency humanitarian relief and long-term national recovery.

Enhancing the Role of Multilateral Institutions Post-Conflict

Enhancing the role of multilateral institutions (MIs) in Sudan post-conflict requires a combination of structural, operational, and political strategies. The goal is to ensure that international support moves beyond emergency relief to sustainable, nationally owned recovery and reconstruction, while avoiding dependency or bypassing Sudanese institutions. For external partnership action, the following are necessary:

Align Engagement with National Frameworks

- Anchor MI programs in the SNRF to ensure priorities, sequencing, and accountability are nationally defined.
- Use the SNRF as the principal coordination mechanism to reduce duplication, prevent parallel systems, and ensure that recovery programs reinforce national institutions.
- Transition from Humanitarian Relief to Development Programming
- Gradually shift resources from short-term emergency assistance to medium- and long-term recovery initiatives, including health, education, infrastructure, and livelihoods.
- Promote integrated “humanitarian-development-peace” (HDP) programming to link relief with durable institutional capacity building.

Support Institutional Rebuilding

- Strengthen ministries, local governments, and civic institutions to enable effective service delivery.
- Invest in training, digital systems, and financial management frameworks to enhance governance, transparency, and accountability.

Embed Justice and Social Cohesion

- Ensure programs incorporate transitional justice, human rights, and reconciliation measures, preventing reconstruction from entrenching impunity or deepening communal divisions.
- Support local civil society and professional associations as key partners in monitoring, accountability, and citizen engagement.

Leverage Financial Instruments Responsibly

- Use grants, concessional loans, and technical assistance to catalyse reconstruction investments while mitigating risks associated with debt distress.
- Prioritise financing that strengthens institutional capacity and supports national priorities rather than substituting for them.

Enhance Coordination and Coherence

- Promote inter-agency coordination among UN agencies, IFIs, and bilateral donors to maximise impact and avoid fragmented interventions (OCHA, 2025; UNICEF, 2025; United Nations, 2023).
- Establish joint recovery task forces or coordination hubs under SNRF guidance.

Encourage Flexibility and Risk-Tolerant Approaches

- Adapt programming to Sudan’s evolving political and security environment.

- Recognise that calculated risk-taking is necessary to enable reconstruction in fragile, post-conflict contexts.

Invest in Monitoring, Evaluation, and Learning

- Implement robust M&E frameworks to assess impact, capture lessons, and adapt programming in real time.
- Include Sudanese stakeholders in monitoring processes to build ownership, accountability, and transparency.

Multilateral institutions can play a transformative role in post-war Sudan if their engagement is coordinated, phased, and nationally anchored. By linking humanitarian, development, and governance programs to the SNRF, embedding justice and reconciliation, and strengthening institutional capacity, MIs can shift from short-term crisis responders to strategic partners in sustainable recovery, peacebuilding, and nation-building.

Bilateral Donors: Flexibility, Leverage, and Strategic Alignment with the SNRF

Bilateral donors remain crucial sources of humanitarian funding, diplomatic engagement, and support for civil society in Sudan. Traditional donors—including European states, North America, and Nordic countries—have historically emphasised humanitarian access, civilian protection, and governance reform (OECD, 2022). Regional actors, particularly the African Union (AU) and the Intergovernmental Authority on Development (IGAD), have played mediation and diplomatic roles, while Gulf states and other emerging actors are increasingly exerting political and financial influence.

While bilateral engagement offers flexibility and political leverage, it also carries risks. Competing geopolitical interests, security-first stabilisation agendas, and fragmented funding streams can undermine coherence and dilute accountability. Without a unifying national framework, international engagement risks remaining reactive and transactional, rather than contributing to transformative, nationally led recovery. Bilateral donors perform multiple, interlinked roles in Sudan's recovery:

- **Humanitarian Funding:** Bilateral donors remain the largest contributors to emergency relief, supporting food security, health, shelter, and protection programs. Their rapid-response capacity bridges the gap between crisis and early recovery.
- **Diplomatic Leverage:** Donors influence political outcomes by incentivising reforms, promoting dialogue among factions, and supporting peace agreements—particularly critical in fragile, post-conflict contexts.
- **Civil Society Support:** Bilateral funding enables NGOs, professional associations, and community-based initiatives to lead recovery efforts locally, strengthening accountability and civic participation.

Regional Actors and Emerging Donors

The African Union (AU), IGAD, League of Arab States, and Organization of Islamic Cooperation (OIC): Regional institutions play a critical role in Sudan's recovery by providing legitimacy, local knowledge, and political leverage that the broader international community often lacks. Through mediation, early warning systems, and political coordination, these bodies help create a framework for dialogue and negotiation that is culturally and politically resonant within the region. Their involvement is particularly important for fostering regional ownership of Sudan's recovery, ensuring that solutions are not perceived as externally imposed but are grounded in the political and social realities of the Horn of Africa and the Arab world. Moreover, these institutions can serve as vital platforms for harmonising donor efforts, coordinating humanitarian responses, and supporting transitional justice and reconciliation processes. However, their effectiveness depends on the coherence of their mandates, the neutrality of their interventions, and their ability to act in alignment with international norms while respecting Sudanese sovereignty.

Gulf States and Emerging Donors: Gulf States and other emerging actors are becoming increasingly prominent in Sudan's reconstruction landscape, providing substantial financial assistance, infrastructure projects, and development investments. Their resources have the potential to catalyse immediate recovery efforts and stimulate economic revival, particularly in sectors such as energy, transport, and urban development. However, these contributions are frequently tied to geopolitical or strategic interests, which may prioritise sector-specific investments or bilateral influence over the integrated, nationally led priorities set out in frameworks such as the Sudan National Recovery and Reconstruction Framework (SNRF). While these partnerships can bring significant capital and technical expertise, there is a risk that they may inadvertently undermine comprehensive recovery planning if coordination mechanisms are weak or if local priorities are sidelined. To maximise impact, Sudan must develop mechanisms to align donor engagement with national strategies, ensuring that emerging financial flows reinforce justice, social cohesion, and inclusive institutional development rather than simply serving external agendas.

The engagement of both regional and emerging actors highlights the multi-layered nature of Sudan's recovery architecture. Regional organisations provide legitimacy and mediation capacities, while emerging donors supply critical financial and technical resources. Effective recovery requires integrating these contributions within a coordinated, Sudanese-owned framework, ensuring that international support complements rather than dictates the country's long-term reconstruction priorities. This balance is essential to avoid fragmentation of recovery efforts, protect national sovereignty, and embed accountability, social cohesion, and institutional resilience at the heart of post-conflict reconstruction. Despite their essential contributions, bilateral actors face several challenges:

- **Fragmented Funding Streams:** Multiple, uncoordinated programs can cause duplication, inefficiency, and competition among implementing agencies.

- **Geopolitical Competition:** Donor priorities may reflect national strategic interests rather than Sudanese recovery needs, potentially undermining impartiality and coherence.
- **Short-Term Focus:** Some programs emphasise immediate stabilisation or security outcomes, at the expense of long-term institutional development or justice-centered recovery.
- **Limited Coordination:** Without a national framework, interventions may bypass local governance and civic institutions, weakening national ownership and accountability.

Strategic Opportunities Anchored in the SNRF

The SNRF provides a pathway to maximise the impact of bilateral engagement:

- **Align with National Priorities:** Direct resources to sectors and regions identified in the SNRF to ensure interventions respond to Sudanese-defined needs.
- **Strengthen Institutional Capacity:** Support ministries, local councils, and civic associations to build sustainable governance rather than parallel systems.
- **Embed Justice and Accountability:** Fund transitional justice, human rights monitoring, and reconciliation initiatives, ensuring recovery is ethically grounded.
- **Enhance Coordination:** Use the SNRF as a shared platform to harmonise programs, reduce duplication, and improve transparency.
- **Flexible, Phased Engagement:** Structure interventions to adapt to Sudan's evolving post-conflict realities, balancing immediate humanitarian needs with longer-term reconstruction goals.

Policy and Advocacy Implications

Aligning bilateral engagement with the SNRF yields multiple benefits for donor governments:

- **Legitimacy:** Supports a Sudanese-led recovery, strengthening rather than bypassing national institutions.
- **Sustainability:** Moves from short-term crisis response to long-term institution-building, reducing aid dependency.
- **Accountability:** Embeds justice, civic participation, and transparency in recovery programs.
- **Efficiency:** Reduces duplication, overlap, and fragmented programming through shared planning and coordination mechanisms.

Synthesis

Bilateral donors bring flexibility, political leverage, and financial resources that are essential for Sudan's recovery. However, their impact is limited when engagement is fragmented, security-driven, or disconnected from national frameworks. Anchoring bilateral support in the SNRF transforms constraints into opportunities, ensuring that donor resources:

1. Strengthen Sudanese ownership and institutions
2. Promote justice and reconciliation
3. Enhance coordination and strategic planning
4. Bridge humanitarian relief with sustainable recovery

In essence, SNRF-aligned bilateral engagement converts short-term relief into long-term, transformative recovery, while safeguarding ethical, justice-oriented outcomes.

In light of the scale of destruction, the fragmentation of international engagement, and the imperative for nationally owned recovery, there is a need for an International Conference for the Reconstruction of Sudan once hostilities have ceased and a credible cessation of war is in place. Such a conference would serve as a strategic platform to mobilise political commitment, coordinate financial resources, and align multilateral, bilateral, and regional actors around a unified recovery vision anchored in the Sudan National Recovery and Reconstruction Framework (SNRF). Beyond pledging financial support, the conference should aim to establish clear principles for engagement—centering national ownership, justice and accountability, institutional rebuilding, and inclusive development—while clarifying the sequencing from humanitarian relief to reconstruction and long-term development. Properly designed, an international reconstruction conference would mark the transition from crisis response to structured recovery, signal international solidarity with the Sudanese people, and provide a coherent mechanism to transform fragmented assistance into a coordinated, accountable, and sustainable pathway toward peace, stability, and national renewal.

International Financial Mechanisms and Structural Constraints on Recovery

Sudan's recovery environment is marked by a stark dichotomy: while humanitarian funding flows remain substantial, the mechanisms for financing medium- and long-term recovery and reconstruction are critically underdeveloped. Pooled humanitarian funds, emergency appeals, and cross-border aid channels have been essential in sustaining millions of lives, addressing food security, health, shelter, and protection needs. However, these instruments are inherently short-term, operating within annual or multi-month funding cycles, and are governed by narrow mandates focused on life-saving interventions. Consequently, they are ill-equipped to support the systemic restoration of governance structures, public

institutions, and service delivery mechanisms, leaving the foundational drivers of fragility largely unaddressed.

Structural financial constraints compound these challenges. Sudan faces severe debt distress, with substantial arrears to multilateral and bilateral creditors, alongside frozen government assets abroad. At the same time, the absence of a widely recognised sovereign financial authority undermines the country's ability to access concessional finance, mobilise domestic revenues, or attract private-sector investment. In such conditions, Sudan remains trapped in a cycle of what some analysts describe as “aid without sovereignty”, in which external financing addresses immediate needs but bypasses national institutions, inadvertently reinforcing dependency and limiting opportunities for local ownership and institutional rebuilding. This dynamic also fosters parallel service delivery systems, where humanitarian actors operate independently of government structures, further fragmenting accountability and coordination.

The SNRF presents a potential corrective to this structural imbalance. By providing a nationally articulated roadmap, the SNRF clearly sequences recovery priorities, identifies sectoral objectives, and establishes governance and accountability benchmarks for donor engagement. This Framework allows international financial institutions (IFIs), bilateral donors, and multilateral agencies to anchor their support within a structured, phased approach that balances immediate reconstruction needs with longer-term institutional strengthening. Critically, the SNRF emphasises financing modalities that enhance the capacity of Sudanese institutions, local governance structures, and civic actors rather than supplanting them. By linking technical and financial assistance to national systems and priorities, the framework offers a pathway to break the cycle of emergency aid dependency, align international support with sustainable state-building, and promote a transition from reactive humanitarian intervention to strategic, nationally led recovery.

Global Norms and Governance Frameworks

International responses to Sudan are shaped by global norms designed to prevent mass atrocities, protect civilians, and support sustainable post-conflict recovery. These include: the Responsibility to Protect (R2P), which obliges the international community to act to prevent and halt genocide, war crimes, ethnic cleansing, and crimes against humanity; international humanitarian law, which codifies protections for civilians, humanitarian personnel, and prisoners during armed conflict; transitional justice frameworks, which provide mechanisms for accountability, reconciliation, and redress; and the humanitarian-development-peace (HDP) nexus, which emphasises the integration of emergency relief, long-term development, and peacebuilding (United Nations General Assembly, 2005).

While these norms provide essential guidance, their practical application in Sudan has often been constrained by political considerations, delayed action, and

operational limitations. Despite early warning signs and extensive documentation of atrocities, international responses have often been delayed, cautious, or subordinated to geopolitical considerations (Deng, 1996). Humanitarian principles of neutrality and impartiality, although vital, have at times obscured accountability or normalised engagement with perpetrators and actors implicated in atrocities. Similarly, R2P obligations have often been invoked rhetorically rather than operationalised effectively, leaving gaps between normative commitment and concrete protective action.

Emerging international approaches, including localisation and nationally led recovery, challenge traditional models of external intervention by recognising Sudanese civic organisations, professional associations, and community networks as active agents of recovery rather than passive aid recipients (United Nations and World Bank, 2018). In this context, the Sudan National Recovery and Reconstruction Framework (SNRF) provides a critical bridge between international norms and local implementation. By aligning humanitarian, development, and justice interventions with nationally defined priorities, the SNRF ensures that global principles are operationalised in ways that strengthen accountability, social cohesion, and institutional resilience. For donors and multilateral actors, this alignment offers multiple strategic advantages:

- **Legitimacy:** International engagement is grounded in Sudanese priorities, reducing the risk of externally imposed or politically biased interventions.
- **Effectiveness:** Integrating relief, reconstruction, and justice interventions ensures that funding and programming have measurable, sustainable impact.
- **Accountability:** By linking support to the SNRF's governance benchmarks, donors and international agencies can embed transparency, civic participation, and rights protection into recovery efforts.
- **Risk mitigation:** Phased, SNRF-guided programming allows international actors to engage in volatile environments while minimising the potential for undermining local ownership or entrenching impunity (Paris, 2004; United Nations and World Bank, 2018).

In sum, global norms provide the moral and legal framework for preventing atrocities and promoting recovery in Sudan. Their effectiveness, however, depends on translation into nationally led strategies such as the SNRF, which operationalise these principles in ways that are accountable, participatory, and sustainable, enabling the international community to move from reactive humanitarian response to proactive, justice-centered recovery and long-term prevention of future atrocities.

Justice, Sovereignty, and the Ethics of International Engagement

The intersection of justice, sovereignty, and international engagement represents one of the most contested and consequential dimensions of Sudan's recovery. International policy debates often treat justice as a sequencing issue, suggesting that accountability can be deferred until stability is restored. Such an approach carries profound risks: it may entrench impunity, undermine social trust, and compromise the legitimacy of reconstruction efforts (De Greiff, 2006).

In Sudan, justice is not a secondary or optional concern—it is a foundational requirement. The genocide has deliberately targeted specific communities, fractured social cohesion, and destroyed public trust in institutions. Recovery processes that proceed without accountability risk consolidating violent power structures and reproducing cycles of atrocity, perpetuating insecurity and undermining long-term peace (De Greiff, 2006). International engagement in contexts of state collapse raises profound ethical questions. When the state itself is implicated in mass crimes, sovereignty cannot be equated with regime recognition, formal authority, or territorial control. Instead, sovereignty must be understood as residing in the people—their collective right to justice, dignity, and self-determination (Deng, 1996).

The Sudan National Recovery and Reconstruction Framework (SNRF) provides a principled and ethical anchor for recovery. By embedding justice, accountability, and civic participation at the heart of planning, the SNRF positions international actors not as external arbiters but as partners supporting a nationally articulated, rights-based vision. Engagement through this framework allows donors, multilateral institutions, and bilateral actors to reconcile operational priorities with ethical imperatives, ensuring that recovery efforts are both legitimate and transformative.

Policy Implications for International Engagement

Justice as a non-negotiable priority. Recovery financing and programming should integrate accountability benchmarks to prevent impunity.

- Sovereignty as people-centered: International support should reinforce Sudanese ownership rather than legitimising regimes implicated in abuses.
- Partnership over imposition: Actors should operate within the SNRF to align interventions with nationally defined justice, governance, and reconciliation goals.
- Civic participation and oversight: Funding, programming, and monitoring mechanisms should include civil society and professional associations as active participants in shaping and evaluating recovery.

By foregrounding justice and ethical responsibility, the SNRF provides a

framework in which international engagement can support reconstruction without compromising accountability, protect vulnerable populations, and lay the foundation for durable and just peace.

The Sudan National Recovery and Reconstruction Framework (SNRF) represents a deliberate effort to move beyond fragmented international interventions and articulate a coherent, nationally owned recovery strategy. By integrating humanitarian relief, transitional justice, institutional rebuilding, and socio-economic reconstruction within a phased and principled approach, the SNRF provides both strategic vision and operational clarity for Sudan's post-conflict recovery.

For international actors, the SNRF functions as a governance interface, offering clear guidance on priorities, sequencing, and accountability while preserving the flexibility needed for diverse forms of engagement. By centering Sudanese civic and professional communities, the framework mitigates the risks of elite capture and externally imposed solutions, ensuring that recovery is both locally legitimate and nationally grounded.

Essentially, the SNRF challenges the conventional assumption that recovery must await the formal end of conflict. Instead, it advocates parallel planning, in which immediate humanitarian needs are addressed while simultaneously laying the foundations for long-term reconstruction, reconciliation, and institutional strengthening. In protracted crises such as Sudan's, this approach is essential to prevent generational collapse, sustain social cohesion, and create the conditions for durable peace.

Taken on board this highlights to operational significance for donors and international partners:

- Alignment and coordination: The SNRF provides a shared framework for harmonising donor funding, multilateral programs, and bilateral initiatives.
- Accountability and transparency: By articulating governance benchmarks, the SNRF enables monitoring of program effectiveness and ethical compliance.
- Flexibility in engagement: International actors can phase interventions to respond to evolving security, political, and humanitarian conditions without undermining national ownership.
- Integration of justice and social cohesion: Programs implemented under the SNRF can simultaneously address immediate needs and embed long-term transitional justice, reconciliation, and institution-building objectives.

Through these mechanisms, the SNRF transforms Sudanese recovery from a fragmented, externally driven set of interventions into a strategically coherent, nationally led process, bridging humanitarian relief with sustainable reconstruction and reinforcing both local legitimacy and international accountability.

Policy Pathways and Strategic Recommendations

To enhance the effectiveness and legitimacy of international engagement in Sudan's recovery, several strategic shifts are essential. These measures aim to move international actors from short-term crisis management toward a model of shared responsibility for sustainable, nationally led reconstruction:

- Align international funding and programming with the SNRF: Position the Sudan National Recovery and Reconstruction Framework as the primary coordination and accountability mechanism for all recovery-related interventions. This alignment ensures that international support reinforces nationally defined priorities, sequencing, and governance standards (OECD, 2022).
- Integrate justice and accountability benchmarks into recovery financing: Embed transitional justice, human rights, and reconciliation criteria within funding frameworks. Doing so ensures that reconstruction efforts strengthen social cohesion and prevent the entrenchment of impunity, rather than inadvertently legitimising actors responsible for past atrocities (De Greiff, 2006).
- Strengthen Sudanese civic, professional, and local governance actors: Prioritise capacity-building and empowerment of ministries, local councils, professional associations, and civil society organisations as principal agents of recovery. This shift reduces reliance on parallel systems and enhances national ownership, transparency, and accountability.
- Reform coordination mechanisms to reduce fragmentation: Establish integrated platforms that bring together multilateral institutions, bilateral donors, and local actors. Coordinated planning mitigates duplication, resolves competition among implementing agencies, and ensures coherent delivery across sectors (OECD, 2022).
- Adopt phased recovery planning during conflict: Recognise that institutional and social repair cannot be postponed until formal cessation of hostilities. Phased planning allows simultaneous attention to humanitarian relief, institutional rebuilding, and reconciliation, preventing generational collapse and laying the foundation for durable peace (Paris, 2004).

The Strategic Implications of this are that:

- International actors can transition from reactive aid providers to strategic partners, supporting Sudanese-led recovery.
- Recovery programming becomes sustainably linked to justice, social cohesion, and institutional resilience.
- Donor funding and technical assistance are targeted, accountable, and harmonised, maximising efficiency and impact.

By implementing these strategic shifts—aligning international funding with the Sudan National Recovery and Reconstruction Framework (SNRF), embedding justice and accountability benchmarks, strengthening local institutions, and improving coordination—the international community can actively shape a recovery process that is cohesive, just, and sustainable.

A well-structured, coordinated, and nationally led recovery builds resilience against shocks—be they renewed conflict, natural disasters, or economic crises. Strengthened institutions, social cohesion, and sustainable development pathways mean that Sudan can absorb and adapt to challenges without slipping back into emergency dependency or fragility.

These strategic shifts transform international engagement from reactive, fragmented aid into proactive, principled, and structured support that fosters a unified, just, and long-lasting recovery in Sudan. It ensures that recovery is owned by Sudanese actors, guided by ethical principles, and equipped to withstand future challenges.

Conclusion: From International Intervention to Shared Responsibility

Sudan's recovery in the aftermath of mass destruction, systematic atrocities and genocide represents a defining test for the credibility, coherence, and moral authority of the contemporary international system. While sustained international engagement remains indispensable, it cannot substitute for Sudanese agency, nor can it succeed if it is detached from justice, accountability, and political legitimacy. The central challenge, therefore, is not whether the international community should engage, but how it engages: moving beyond interventionist paradigms toward genuine partnership models that reinforce national ownership while upholding international responsibility to prevent atrocity crimes (Deng, 1996).

Anchored in the Sudan National Recovery and Reconstruction Framework (SNRF), the chapter emphasises that post-genocide recovery cannot be treated as a purely technical or externally managed process. Recovery in Sudan must first and foremost be a national project, driven by Sudanese priorities, perspectives, and actors. International engagement should support, enable, and enhance this process, rather than assume control or impose externally defined solutions.

The scale and severity of the atrocities—including systematic targeting of civilian populations, ethnic-based violence, and widespread destruction of public institutions—mean that conventional approaches such as emergency humanitarian aid or purely technical reconstruction are insufficient. While essential for immediate survival and stabilisation, such measures alone cannot address the underlying drivers of conflict, injustice, and social fragmentation.

Instead, recovery must be conceptualised as a comprehensive moral, political, and institutional endeavor. This entails:

1. Addressing root causes of violence: Tackling systemic grievances, entrenched inequalities, and power imbalances that contributed to mass atrocities.

2. Restoring trust between state and society: Rebuilding the legitimacy of public institutions and fostering inclusive governance that connects citizens to decision-making processes.
3. Rebuilding institutions on foundations of justice and accountability: Ensuring that reconstruction processes embed principles of the rule of law, human rights protection, and social inclusion.

Without such a transformative approach, recovery risks reinforcing the same structures, hierarchies, and power dynamics that enabled mass violence in the first place. In other words, reconstruction that is not ethically and politically grounded could inadvertently perpetuate cycles of conflict, undermine social cohesion, and leave Sudan vulnerable to further crises.

The SNRF provides the framework to operationalise this vision: aligning short-term humanitarian interventions with long-term strategies for justice, social reconciliation, institutional strengthening, and sustainable development. It emphasises that national ownership is not optional but central—international actors are partners, not directors, in this essential national project.

The international community bears not only a humanitarian obligation but a clear moral and political responsibility to prevent the recurrence of genocide in Sudan. Fulfilling this responsibility requires a coordinated and principled strategy that integrates early warning and rapid response mechanisms with long-term investments in inclusive and accountable governance, robust transitional justice frameworks, and meaningful civic participation. These efforts must be underpinned by enforceable international norms and sustained diplomatic engagement, rather than episodic or crisis-driven interventions.

Crucially, prevention is most effective when it is embedded within long-term, nationally led recovery processes such as the Sudan National Recovery and Reconstruction Framework (SNRF), which place accountability, social cohesion, and institutional resilience at the core of reconstruction. By situating atrocity prevention within a Sudanese-owned recovery framework, the international community can move beyond reactive crisis management toward sustained protection of human rights and the consolidation of a just and durable peace. In this sense, Sudan's recovery is not only a national imperative but a collective responsibility—one that will shape global norms on post-genocide reconstruction, prevention, and shared accountability for years to come.

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CHAPTER 5

GEO-POLITICAL INSTABILITY AND SUDAN'S ECONOMIC RECOVERY

Gerard McCann

One of the largest regions of the Sahel, Sudan has suffered immensely through political disruption and a chronic lack of human security and economic investment. Political crises layered on development disengagement, compounded by civil war and a humanitarian catastrophe has brought the country to the situation where it is recognised to be one of most volatile regions on earth. Sudan's economy remains in a state of flux, unproductive and underactive since the outbreak of civil war in April 2023. The effects of this conflict have been not only the profound human costs - with an estimated 150000 dead and 11 million displaced - but it has also devastated the economic infrastructure, debilitated most economic activity with a systemic shock represented by commercial collapse, hyperinflation and a seismic contraction of the gross domestic product (GDP).

The downward trajectory of the economy is something that has been registered across the board for many years preceding the civil war and, arguably, can be seen to be a trigger for the violence that erupted in 2023. As noted by the African Development Bank Group:

“The ongoing conflict has reversed the limited progress Sudan has made in structural transformation. In recent years, productivity declined 30% in services, the main employment sector, while increasing 20% in industry and remaining unchanged in agriculture. Between 2010 and 2022, the share of employment in agriculture declined from 49.7% to 40%, while that of services increased from 41.8% to 45% and that of industry remained stable at 15%.” (African Development Bank Group, 2026)

The wealth of the country in terms of natural and human resources is evident with every measurement, and there were signs of the possibility of harnessing that wealth for the betterment of the people of Sudan in the years prior to the COVID-19 pandemic of 2020. However, there was a sharp reversal of the potential of the economy as the violence spread geographically and became endemic.

The possibilities of recovery are still evident though, demanding a multifaceted focus that policy-makers and businesses alike have to take into account. That is, that Sudan in peace could be a driver of development regeneration for the whole of the Horn of Africa. A London School of Economics and Oxford University analysis of Sudan in the period prior to the war and pandemic provided

some insight into the scope for development, “... a window of opportunity to enact and implement fundamental reforms that create a foundation for strong economic relationships and can harness trade and investment opportunities to benefit the Sudanese people” (Asare et al, 2020, p. 3). This chapter will look at the impact of the war on the economy and will survey the assets and features of the Sudanese economic base that could act as an accelerating agent for general societal and regional recovery.

The Extent of the Collapse

The form of conflict that has ravaged through the country over the past number of years has been particularly affecting for economic hubs and indigenous businesses. Real Gross Domestic Product (GDP) contracted by an estimated 37.5% in the first year of the war, with a further decline through to 2026. The value of the economy shrunk by over 40% from pre-conflict levels by the end of 2025 (Economist Intelligence Unit, 2026; Work Bank, 2026). While specific conflict related effects are pertinent to all conflict related regions of the Sahel, they have been notably stark in the Sudanese scenario. It has seen a sharp level of hyperinflation matched by a currency devaluation debasing the Sudanese Pound (SDG). Extreme inflation had reached 200% in 2024, with the SDG even collapsing in value against the US dollar in the black market.

What this sparked was an accelerating round of unemployment and accentuated stress on the labour market, compounding high levels of poverty and a cycle of underdevelopment. With this, going into 2024, more than half the population were suffering from acute food insecurity and a rate of poverty, already high before the war, increasing substantially. By all accounts, half of all jobs were lost due to the fighting. “Sudan faces a dire economic situation, with the conflict negating any prospects of economic and financial stabilisation over the forecast period [2024-2028] and exacerbating operational risks” (Economist Intelligence Unit, 2026; IPC, 2025). State revenues have decreased by an estimated 80%, with the formal economy described as being at a “near standstill”. The government is unable to set a national budget and relies heavily on informal gold revenues and its global market to fund basic governmental operations. Public debt is unsustainable, reaching over 250% of GDP in late 2023.

The war in Sudan has severely impacted almost all business sectors, causing over 50% value loss in industry and a 33.6% contraction in the agri-food sector, with major damage to manufacturing, oil refining, and gold mining. Small businesses, transportation, banking, and import/export trades have been frozen, resulting in massive job losses and widespread economic collapse (Chatham House, 2025).

“Supply chain disruptions, shortage of inputs, reduced agricultural production and missed planting season in conflict-affected areas as

well as disruption in the irrigation schemes in Al Jazirah, have led to sustained increases in food prices, which become even more prominent during the seasonal peak of food shortages. These challenges, compounded by worsening terms of trade, soaring inflation, loss of livelihoods, and currency depreciation, have significantly eroded households' purchasing power, leaving many families unable to afford basic food items ... In September 2025, commercial fuel prices surged across Sudan. Petrol rose by 58 percent and diesel by 41 percent compared to September 2024, straining local economy and driving food price inflation.” (IPC, 2025, p. 2)

The primary economic sectors affected adversely by the conflict are:

- Agriculture and food production - most crops, including the important gum arabic and sesame seed production have been disrupted, leading to major food shortages. Sudan is facing the world's most significant hunger crisis in 2026, with over 21 million people (45% of the population) experiencing acute food insecurity. The United Nations have reported that famine was confirmed in North Darfur areas like Um Baru and Kernoï. Furthermore, the famine is spreading, with acute malnutrition in children and women expected to rise 13.5% through 2026 to nearly 4.2 million cases (World Food Programme, 2026).
- Manufacturing and industry - The Bahri Industrial Area, which houses numerous factories and warehouses, has been heavily damaged or destroyed.
- Energy and oil sector - The Al Jili oil refinery, which provides 60% of Sudan's gasoline, has faced repeated damage and occupation.
- Mining and gold trade - Mining operations are disrupted due to security, loss of foreign workers, and halted imports of necessary processing chemicals like mercury and cyanide.
- Banking and finance - Banking services have seen a severe contraction, and the local currency has depreciated, crippling financial operations.
- Small and Medium Enterprises (SMEs) - Micro- and small-scale manufacturing face destruction, looting, and loss of skilled personnel.
- Healthcare and pharmaceuticals - Medical centers have been looted or rendered inoperable, destroying drug supplies and in-service renal centers. Clinics have been deliberately targeted across the country.
- Transportation and logistics - Trade routes have been blocked, and transportation costs have skyrocketed, severely limiting the distribution of goods (Chatham House, 2025).

There has been a remedial response to the crisis also. Businesses and

communities have been seeking out adaptive operations to stimulate growth and survive through highly adverse market circumstances. Surviving businesses have sought to adapt by turning to solar power, where possible on-line operations, digital payments via apps due to unreachable offices, barter, and localised, small-scale trade to survive. The culture of survival economics has again become the mainstay of economic activity for the vast majority of the economically active population.

In a cursory survey of the key sectors, the situation is one of collapse which further aggravates the desperate situation of the population. For example, with agriculture - the mainstay of the Sudanese economy - this sector remains the backbone of livelihoods, employing a large majority of the workforce. Over 60% of agricultural land has been rendered out of service by an inability to work it due to the high levels of danger and violence. This is further complicated by the impact of climate change and particularly flooding. Also, exports and sales have become income generating means by the warring factions for sustaining the military operations and while Sudan is the world's largest producer of gum arabic and produces cotton, sesame, and livestock, all have become important exports for maintaining the war (IPC, 2026).

A second key sector, gold mining, is one of the few large-scale sectors still operating and generating foreign currency (Chatham House, 2025). Sudan in war has unfortunately become a region where illegal operations and illicit exporting have become endemic, even drawing in Eastern European mercenaries to plunder through areas affected by conflict in search of gold produce, jewellery and antiques. In this way significant amounts of gold are being siphoned out of the country onto the world market. 'Blood Gold' now matches 'Blood Diamonds' across the global to finance conflict materiel. Both warring sides jostle for control over gold-rich areas to finance their operations.

The third significant sector which can be seen to register on the global markets, and which have been adversely affected by the conflict, has been the oil industry. This industrial sector, heavily concentrated in the capital Khartoum, has been severely compromised. The secession of South Sudan in 2011 had already removed most of Sudan's oil reserves, but the remaining oil infrastructure has been impacted by the 2023 war. With the civil war, oil production in Sudan itself has dropped from roughly 64,000 barrels per day (bpd) (before the war) to approximately 20,000–33,000 bpd by late 2025. Africa News reported that:

“According to Sudan's finance ministry, oil revenues have fallen by more than fifty percent compared to pre-conflict levels, depriving the government of crucial income. Industry experts warn that the lack of refining capacity and continued attacks on infrastructure are creating a severe shortage of fuel, leaving ordinary Sudanese struggling to access essential energy products.” (Africannews, 19 January 2026)

As a major hub for economic activity, the stability of production and exporting oil is critical to the long term political and economic prospects for the country in general.

Sudan's Economic Disaster

Across Sudan, with the roll out of the war and the desperate excesses of forces and international actors in a land grab and spoilation, the fabric of economic development has been routinely destroyed. The burning of crops and food storage facilities outside Omdurman for example, looted and set aflame in June 2023, was a wanton act of vandalism which could only affect the local population and force hunger as a means of generating political pressure on opposing forces. The displacement of more than 14 million people has caused a humanitarian crisis of global proportions placing huge pressures on health and education systems. This has also affected the whole east of the continent, with over one million Sudanese displaced and largely having to relocate to the Giza vicinity of Egypt. Half of the population of 50 million are facing severe food insecurity (UNHCR Dashboard, 2 February 2026; Espriu, 2025).

Khalid Saddig from Sudan Strategy Support Program, International Food Policy Research Institute (IFPRI), in a post titled 'Sudan's War is and Economic Disaster', outlined the severity of the situation for the country as it moves into another year of the wastage, concluding that the war has been "devastating". Sudan's finance minister reported as early as November 2023 that the war had at that point accrued losses exceeding \$26 billion, which was "half the value of the country's economy a year earlier. The industrial sector, which includes manufacturing and oil refining, has lost over 50% of its value. Employment has fallen by 4.6 million jobs over the period of the conflict" (Saddiq, 2026). The impact has been a shock to every point of economic activity - with a particular hit on the local/indigenous sectors.

The long-term projections for this intrusive total war that had spilled out through the various regions of the country will invariably mean mass unemployment and a collapse of production in most industrial contexts. This feeds into further conflict. The resultant contraction in income generation will have a corresponding effect on welfare and public service provision, the closure of schools, universities, hospitals, and clinics. The flight of professionals has already been seen, and those fortunate enough to have the option to migrate legally have been availing of this safeguard. For those who seek refuge internally this has meant a transitory life and precarious life experience that is so prevalent in the war torn areas of the Sahel - life limiting circumstances and environments. Illegal emigration and entering into the world of human trafficking is another highly dangerous route for many of the most vulnerable. It is a whole area of the war economy that is absolutely under-studied and rarely spotlighted.

Taken in the round, it is about socio-economic collapse and the

disintegration of a country on the extreme. Saddig's long term modelling, which factors in a continuation of the war, is stark:

"Sudan was already in a fragile state before the war. It was reeling from decades of underinvestment, international sanctions and institutional breakdown. The war has reversed hard-won gains in poverty reduction. It is also dismantling key productive sectors—from agriculture to manufacturing—which will be essential for recovery once the conflict ends. Every month of continued fighting adds to the damage and raises the cost of rebuilding. Our projections already show major economic collapse, yet they don't include the full extent of the damage. This includes losses in the informal economy or the strain on household coping strategies. The real situation could be even worse than what the data suggests." (Saddig, 2026)

As noted by the African Development Bank, the fiscal deficit widened to 9.1% of GDP in 2023 as tax revenue declined from 5.6% of GDP in 2021 to 2.0% in 2023. With revenue costs and increasing expenditure, inflation rose to 245.3% in late 2023. Inflation was matched by consumer goods and food shortages and currency depreciation. From the United Nations Human Development Index based on recent reporting for the 2023/2024 period (2025 context), Sudan has a low Human Development Index (HDI) score of 0.511. The ranking is in the bottom tier globally, categorised under 'low human development', largely driven by extreme poverty and conflict. Sudan remains in debt and acute distress as political instability frustrates progress towards the Heavily Indebted Poor Countries (HIPC) debt reduction initiative.

"The current account deficit, which was financed by remittances and international reserves, widened to 7.3% of GDP in 2023 due to weak export performance. Reserves dropped from 2.7 months of import cover in 2022 to 1 month in 2023. Whereas nonperforming loans remained below 5% of gross loans in 2022, subdued economic activities reduced borrowers' ability to service debt, raising nonperforming loans to above 10% of gross loans in 2023." (African Development Bank Group, 2024)

All in all, war is not an option for the development of Sudan in any shape of form. The remit of this chapter is to speculate on the possibility of a peaceful reintegration of economy activity which in effect would be building for a sustainable future, giving its population a scenario where they can work towards utilising the potential of the natural and human resources of the country for the benefit of the people of the country. The recovery of Sudan is, beyond the most egregious terms,

only possible through a peaceful environment. Once that takes effect, with the support of the international community, relative community security and critical services - including reconstructed hospitals and clinics - will assist in providing the framework for other forms of security, including food security and educational advancement. Economic activity should naturally emerge out of this context.

Forging Recovery

The economic future of Sudan largely depends on ending the current hostilities. International partners and financial institutions such as the World Bank and African Development Bank Group are involved in humanitarian aid and recovery planning, but lasting stability will require a comprehensive peace agreement, significant reconstructive investment, the rebuilding of institutions, and economic diversification. Mohammed Yousif Sukkar, in his 2025 book *Sudan: A Vision for the Future*, made a salient point on the criticality of coordination and the need for leadership with vision to carry Sudan beyond the present:

“The squandered wealth could have made Sudan one of the richest countries in Africa. There is no doubt that the raging war has this wealth as one of its target. And closing all taps that have been draining our wealth is one of the top priorities. In this regard, culturally acceptable tendencies to leniency and clemency, although useful for maintaining limited tribal unrest and social relations, are not suitable for security when national or regional peace and economic security are at stake.” (Sukkar, 2025, p.105)

In building a framework for sustainable development and the proper utilisation of resources, peace building in practice needs to be prioritised. Only the protagonists can hold fire.

Recovery would need to be supported substantially by reconstructive spending, and this would need to be internationally leveraged. Development would - while acknowledging the environmental consequences - be heavily dependent on the exploitation of raw earth minerals, mining and drilling for oil. Targeted spending would need to be on social services and the basic infrastructure, with a corresponding investment in economic regeneration across all aspects of the economy. The African Development Bank noted earlier in the war that: “If peace is restored, the anticipated increase in government revenues would moderate inflation to 157.9% in 2024 and further to 85.6% in 2025. The fiscal deficit would narrow slightly to 6.3% in 2024 and further to 2.8% in 2025” (African Development Bank, 2024). This gives some indication of the projected peace dividend. This is all presuming that peace can be sustained and that there is definite commitment from the international financial institutions in particular to the reconstruction of Sudan. Their support is never guaranteed.

Remittances are important in any recovery plan. The pre-war investment from the diaspora was the mainstay of livelihoods for families and communities across the country. This micro-financing faltered during the war, but this method of development remains a largely unexamined catalyst for regeneration. Subject to supportive banking systems and a flexibility in receipt, the organic nature of this system of financial involvement is immense. Worth an estimated \$3 billion, this wealth could act as a springboard for recovery. As the United Nations Development Programme 2020 report notes: “Understanding this lifeline and maximising its value as a source of foreign currency and investment are crucial for a new Sudan” (UNDP, 10 September 2020).

It is notable that in the midst of the war there is ongoing work to stabilise the situation and to anticipate a country beyond conflict. This can be seen with the Public Finance Review (PFR) and with the Public Financial Management (PRM) reform. Both offer answers and with the watchful monitoring of the likes of the African Union (AU) there is a basis for a momentum for sustainable peace building.

“The Public Finance Review (PFR) provides a timely and actionable roadmap for restoring economic stability in South Sudan. As a government, we are committed to taking immediate steps by accelerating the implementation of Public Financial Management (PFM) reforms and strengthening budget discipline. These reforms are essential to rebuild trust, stabilize our economy, and deliver basic services to our people”. Honorable Benjamin Ayali Koyongwa, Undersecretary of Planning in the Ministry of Finance, Republic of South Sudan. (World Bank, 5 February 2026)

Unfortunately, sustained conflict has reversed what limited progress Sudan has made in economic transformation. Even a cessation of violence will serve to accelerate economic stabilisation and indeed transformation. Sudan in peace – even an unsteady peace working towards just and lasting solutions – can create an environment where labour skills, training, innovation and formalisation can strengthen private sector growth.

In a postwar Sudan, effective financing with international backing could strengthened financial and economic governance, manage remittances and commercial activities to envisage the potential for Sudan as a natural hub of development for the whole of the Horn of Africa. Sudan could hold a unique space in the global financial architecture and as an export repository for the whole region. The benefits would be exceptional for the Sudanese people and those who are fortunate to connect to this vast resource and human energy.

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CHAPTER 6

GOVERNANCE FOR NATIONAL RENEWAL: DEMOCRATIC FEDERALISM, RECOVERY FROM BELOW, AND THE RECONSTRUCTION OF THE SUDANESE STATE

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Governance has remained at the heart of Sudan's political crisis since independence. Successive governments have experimented with centralisation, regional administration, decentralisation, and federalism in the hope of resolving persistent problems of political exclusion, uneven development, weak institutions, and recurring conflict. Yet despite repeated constitutional reforms, peace agreements, and administrative restructuring, governance has seldom delivered the stability, accountability, equitable development, or public confidence necessary for a resilient democratic state.

The war that erupted on 15 April 2023 fundamentally transformed both the context and the urgency of this debate. Previous constitutional discussions generally assumed the existence of functioning state institutions. Today, Sudan confronts the far more demanding task of rebuilding a state whose administrative, economic, judicial, and service-delivery systems have been severely disrupted. Widespread institutional collapse, massive displacement, destruction of infrastructure, and the fragmentation of public authority require governance to be reconsidered not simply as a constitutional arrangement but as the principal instrument of national recovery.

This chapter argues that Sudan must move beyond the traditional debate between centralisation and federalism. Both remain important constitutional questions, but neither adequately addresses the challenge of rebuilding the state after catastrophic conflict. The central question is no longer how power should be distributed between different levels of government; rather, it is how governance can restore institutional legitimacy, protect human security, promote democratic citizenship, rebuild public trust, and enable sustainable recovery.

Accordingly, governance is examined here within the broader framework of Recovery from Below, operationalised through the Sudan National Recovery and Reconstruction Framework (SNRF) and the Smart Village Network (SVN). In this approach, governance is understood not as an end in itself but as the institutional architecture through which recovery, resilience, reconciliation, and national renewal become possible.

This perspective reflects an important evolution in contemporary thinking on post-conflict reconstruction. Increasing evidence suggests that sustainable recovery depends not solely upon constitutional settlements negotiated among

political elites but upon capable local institutions, active citizenship, accountable public administration, and resilient communities (Fukuyama, 2004; Sen, 1999). Communities are not passive beneficiaries of recovery; they are its principal agents. Effective governance therefore strengthens society's existing capacities rather than replacing them with increasingly complex bureaucratic structures.

The Sudanese experience during the current conflict reinforces this conclusion. In many parts of the country, local communities continued to organise humanitarian assistance, maintain essential services, mediate disputes, support displaced populations, and preserve social cohesion despite the collapse of formal state institutions. These experiences demonstrate that recovery begins where society continues to function. It begins with citizens. It grows through communities. It is sustained by democratic institutions.

Governance and Sudan's Structural Crisis

Sudan's governance crisis has never been solely administrative. It reflects deeper structural weaknesses in state formation, constitutional development, political inclusion, fiscal management, and institutional accountability. Throughout much of the country's post-independence history, governance reforms frequently addressed administrative arrangements without adequately confronting the underlying political economy of power, citizenship, and development.

Successive constitutional experiments often produced new administrative structures while leaving intact highly centralised systems of political decision-making and resource allocation. Therefore, decentralisation frequently became administrative in appearance but centralised in practice. Local governments assumed increasing responsibilities without acquiring corresponding fiscal authority, institutional capacity, or democratic autonomy (El-Battahani and Gadkarim, 2017).

These weaknesses were compounded by patterns of patronage, political fragmentation, and unequal regional development. As de Waal (2015) argues, Sudan increasingly evolved into a political marketplace in which public institutions became instruments of political bargaining rather than mechanisms of accountable governance. Administrative expansion often reflected short-term political settlements rather than long-term institutional planning, while public expenditure increasingly supported recurrent administration rather than productive investment.

The consequences became starkly visible following the outbreak of war in April 2023. Institutions that had already been weakened by decades of political interference, fiscal constraints, and administrative fragmentation proved unable to withstand prolonged conflict. Ministries ceased functioning across extensive areas of the country. Courts suspended operations. Health systems collapsed. Schools closed. Local administrations disappeared in many localities. Millions of citizens found themselves relying upon communities, voluntary organisations,

professional associations, women's groups, religious institutions, and informal networks rather than formal government.

An important lesson emerges from this experience. Society frequently demonstrates greater resilience than the state. Recovery should therefore build upon the capacities that remained functional during the crisis rather than attempting simply to reconstruct pre-war administrative arrangements. This principle forms the foundation of Recovery from Below.

Lessons from Sudan's Constitutional Experience

Sudan's constitutional history offers valuable lessons for future governance reform. Since independence, constitutional arrangements have repeatedly sought to balance national unity with regional diversity, yet durable institutional solutions have remained elusive.

During the colonial period, systems of indirect rule provided relatively inexpensive territorial administration but also reinforced regional inequalities and institutional fragmentation. The Closed District Ordinances deepened administrative separation between different regions of Sudan, leaving a legacy that continued to influence post-independence constitutional debates (Johnson, 2014).

Following independence, demands for federalism emerged principally from southern political leaders who regarded regional autonomy as essential for preserving national unity while accommodating cultural, political, and developmental diversity. These proposals reflected legitimate concerns regarding representation, citizenship, equitable development, and political participation. Their rejection contributed to increasing political polarisation and ultimately to prolonged civil conflict (Johnson, 2014).

Subsequent governments repeatedly revisited decentralisation through different constitutional arrangements. The Addis Ababa Agreement recognised regional autonomy as an important foundation for peace, while later constitutional reforms under the Ingaz government introduced an extensive system of states and localities. Although these reforms appeared highly decentralised institutionally, effective political authority and fiscal control remained concentrated within the Federal Government. States depended heavily upon central transfers while major sources of national revenue remained centrally controlled (El-Battahani and Gadkarim, 2017).

The principal lesson is clear. Administrative multiplication does not necessarily strengthen federalism. Nor does it guarantee improved governance. Effective decentralisation depends less upon the number of administrative units than upon institutional capacity, fiscal sustainability, democratic accountability, and the quality of public services delivered to citizens. Contemporary governance theory similarly emphasises that resilient public administration depends upon cooperation among multiple, interconnected centres of decision-making rather than the exclusive concentration of authority within a single hierarchical structure

(Ostrom, Tiebout and Warren, 1961). Recovery from Below adopts this principle by proposing a polycentric system in which communities, local government, regional institutions, and the Federal Government each exercise clearly defined and complementary responsibilities within an integrated constitutional framework.

The Democratic Aspirations of the December Revolution

The December Revolution of 2018–2019 represented one of the most significant expressions of civic mobilisation in Sudan’s modern history. Although subsequent political developments produced differing constitutional visions, the Revolution articulated enduring aspirations that continue to inform discussions of governance and national renewal.

Its central slogan—**Freedom, Peace, and Justice**—expressed a collective demand for accountable government, equal citizenship, human dignity, social justice, and democratic participation. The widespread call for **Madaniya** (civilian rule) similarly reflected a broader aspiration for constitutional governance founded upon civilian institutions, the rule of law, and public accountability.

Recovery from Below embraces these aspirations while recognising that constitutional principles must be translated into functioning institutions. Democratic values acquire practical meaning only when supported by accountable public administration, effective local government, transparent public finance, independent courts, and active citizen participation.

The Sudan National Recovery and Reconstruction Framework therefore seeks to operationalise these aspirations by embedding democratic participation within everyday governance. Democracy becomes not simply a constitutional principle or an electoral process, but a continuous practice exercised through Village Councils, Smart Localities, regional institutions, civil society organisations, and informed citizenship. In this way, Recovery from Below does not replace the aspirations of the December Revolution. It provides the institutional architecture through which those aspirations may be realised.

Governance Beyond Power-Sharing: Lessons from the Juba Peace Agreement

The experience of the Juba Peace Agreement (JPA) provides important lessons for the future architecture of governance in Sudan. Peace agreements are indispensable instruments for ending armed conflict, yet their long-term success depends not only upon political compromise but also upon the quality of the institutions they establish. Sustainable peace cannot rest exclusively upon the allocation of political offices; it requires accountable governance, transparent public financial management, constitutional oversight, and institutions capable of commanding public confidence.

The JPA largely reflected an executive power-sharing model in which political office became the principal mechanism for incorporating armed movements into the transitional state (Geneif, 2026a). While such arrangements may contribute to

reducing immediate violence, they also risk reinforcing institutional fragmentation when executive authority expands without corresponding mechanisms of accountability, financial oversight, and constitutional restraint.

The Sudanese experience illustrates this challenge. The Agreement distributed ministerial portfolios, seats within the Sovereign Council, parliamentary representation, and executive authority among the signatory parties. Through these arrangements, political actors acquired influence over strategically important public institutions responsible for taxation, mining, social protection, health insurance, and other sectors central to national recovery (Geneif, 2026a). Although politically understandable during a fragile transition, these arrangements also exposed weaknesses in public financial governance, administrative coordination, and institutional accountability.

The principal lesson is that peace agreements should strengthen institutions rather than merely redistribute political authority. Constitutional settlements should therefore establish independent auditing bodies, parliamentary financial oversight, constitutional review, transparent budgeting systems, anti-corruption institutions, and equitable mechanisms for intergovernmental fiscal transfers before extensive executive power-sharing arrangements are implemented.

Recovery from Below consequently regards governance not as the distribution of political offices but as the creation of trustworthy public institutions capable of serving citizens regardless of political affiliation.

Justice, Security and Democratic Governance

Governance cannot flourish where justice is absent, nor can democratic institutions function where security remains fragmented. Justice, security sector reform, and constitutional governance are therefore mutually reinforcing pillars of national reconstruction rather than separate policy domains. As Geneif argues, meaningful federal governance requires institutions capable of protecting both constitutional order and the rule of law (Geneif, 2026b).

Sudan's constitutional history demonstrates that prolonged political instability has often been accompanied by the concentration of coercive power, weakening of judicial independence, and erosion of civilian oversight. Such conditions undermine public confidence in government irrespective of constitutional design.

The reconstruction of governance should therefore include comprehensive reform of the security and justice sectors. A future democratic state should possess a single professional national defence force operating under civilian authority, accountable policing founded upon the rule of law, an independent judiciary, constitutionally protected human rights, and transparent parliamentary oversight of all security institutions.

These reforms are not merely constitutional aspirations. They constitute practical preconditions for recovery. Communities cannot participate confidently

where violence persists. Investment cannot expand where justice remains uncertain. Institutions cannot command public trust where impunity prevails. Recovery therefore requires security governed by law rather than by political power.

Transitional Justice as a Foundation of Recovery

No programme of national recovery can succeed without addressing the legacy of conflict. The war that began on 15 April 2023 resulted in widespread civilian suffering, forced displacement, destruction of livelihoods, grave violations of international humanitarian law, and extensive damage to public institutions. Rebuilding physical infrastructure alone cannot restore public confidence. Justice must also be rebuilt.

Recovery from Below therefore places transitional justice at the centre of democratic reconstruction. Transitional justice should pursue several complementary objectives: establishing the truth concerning violations committed during the conflict; ensuring accountability for serious crimes through independent judicial processes; recognising and supporting victims through appropriate reparations; reforming institutions associated with past abuses; and promoting national reconciliation through dialogue, acknowledgement, memorialisation, and institutional learning. These objectives should reinforce rather than compete with one another. Justice without reconciliation risks perpetuating division. Reconciliation without accountability risks institutionalising impunity. Democratic recovery requires both.

Sudan possesses important indigenous traditions of mediation, reconciliation, consultation, and restorative justice that may contribute significantly to these processes. Such traditions should complement, rather than replace, constitutional guarantees, judicial independence, and internationally recognised human rights. Recovery from Below therefore rejects both revenge and impunity. Its objective is democratic reconciliation founded upon truth, justice, institutional reform, and equal citizenship.

Governance After State Collapse

The governance challenge confronting Sudan today differs fundamentally from earlier constitutional debates. Previous discussions generally assumed the continued existence of functioning ministries, courts, schools, hospitals, and administrative institutions. The present reality is one of widespread institutional disruption. The central governance question has therefore changed. It is no longer simply: *How should Sudan be governed?* It has become: *How can governance itself be reconstructed?*

Recovery from Below answers this question by reversing the traditional direction of state-building. Instead of rebuilding government exclusively from the centre outward, reconstruction should begin where governance continues

to function within communities themselves. Throughout the conflict, villages, neighbourhoods, voluntary organisations, women's associations, youth initiatives, professional bodies, and religious institutions repeatedly demonstrated extraordinary organisational capacity. They provided humanitarian assistance, maintained essential services, mediated local disputes, protected vulnerable populations, and sustained social cohesion under exceptionally difficult circumstances. These experiences reveal an important institutional lesson. Communities possess governance capacity.

Future constitutional arrangements should therefore strengthen these capacities rather than replace them with increasingly centralised administrative systems. Governance becomes a partnership in which citizens, communities, public institutions, civil society, universities, the private sector, and development partners contribute complementary strengths to national recovery.

Recovery Governance: A New Constitutional Philosophy

Traditional decentralisation concerns the transfer of administrative authority from the centre to subordinate levels of government. Recovery Governance proposes a broader constitutional philosophy. Its objective is simultaneously to restore public services, strengthen democratic participation, rebuild institutional legitimacy, revitalise local economies, protect human security, promote reconciliation, generate knowledge, and strengthen community resilience.

Governance therefore becomes an enabling system for national recovery rather than simply an administrative arrangement. This philosophy reflects the broader principles of **polycentric governance**, in which multiple centres of authority cooperate while remaining accountable for clearly defined constitutional responsibilities (Ostrom, Tiebout and Warren, 1961). Rather than concentrating authority within a single administrative hierarchy, governance is distributed across interconnected institutions operating at community, locality, regional, and federal levels. Such arrangements strengthen institutional resilience, improve responsiveness, encourage innovation, and locate decision-making as close as practicable to citizens.

The central question therefore ceases to be: How should authority be distributed? Instead, it becomes: How can governance improve the lives of citizens while strengthening democratic institutions? This question provides the organising principle for the governance architecture proposed in the remainder of this chapter.

Rationalising the Federal Structure

The territorial organisation of Sudan should no longer be determined primarily by historical political compromises, temporary peace settlements, or short-term administrative considerations. The catastrophe of 2023 provides a unique opportunity to redesign the federal system according to the principles of

democratic governance, administrative efficiency, fiscal sustainability, equitable development, and national recovery.

Over the past three decades, Sudan has witnessed a progressive expansion in the number of states, localities, ministries, and administrative institutions. Although these reforms were often introduced in the name of decentralisation and improved service delivery, they also generated increasing recurrent expenditure, institutional duplication, administrative fragmentation, and heavy dependence on transfers from the Federal Government. In many instances, the expansion of administrative structures exceeded the growth of institutional capacity and financial resources, thereby limiting the effectiveness of decentralisation and reducing investment in development.

The principal lesson is that decentralisation should not be judged by the number of administrative units but by the quality of governance, accessibility of public services, fiscal sustainability, democratic accountability, and improvements in citizens' wellbeing. Recovery from Below therefore advocates a comprehensive constitutional review of Sudan's federal structure to establish *the minimum number of administratively viable, economically sustainable, and development-oriented federal regions or states capable of supporting effective governance and balanced national development*. Rather than prescribing a predetermined number, the future territorial organisation should emerge from objective constitutional, demographic, geographical, economic, environmental, and administrative criteria, informed by broad national consultation and supported by independent technical assessment. The guiding principle should be functionality rather than political accommodation.

Larger and institutionally stronger federal units are generally better positioned to undertake strategic planning, coordinate major infrastructure, manage specialised public services, promote balanced regional development, and mobilise investment than highly fragmented administrative entities with limited institutional and fiscal capacity. Rationalising the federal structure would also release substantial public resources currently consumed by recurrent administration, allowing greater investment in Primary Health Care, education, infrastructure, agriculture, environmental protection, digital transformation, and community recovery.

The objective is therefore not to weaken federalism. It is to strengthen it. Federal units should function principally as *development regions*, responsible for strategic planning, regional infrastructure, higher education, specialised health services, environmental management, economic coordination, disaster preparedness, and inter-locality cooperation, rather than merely constituting additional layers of political administration. The primary arena of democracy, however, should remain the community.

Citizens participate directly through Village Councils and Smart Localities, while higher levels of government provide coordination, strategic planning, and

constitutional support. Power should therefore flow simultaneously upward and downward. Citizens elect Village Councils. Village Councils form Smart Localities. Smart Localities coordinate clusters of communities. Federal regions or states provide strategic planning and regional coordination. The Federal Government safeguards constitutional unity, macroeconomic stability, foreign affairs, national defence, and national standards.

This governance architecture deliberately avoids both excessive centralisation and unnecessary administrative fragmentation. Authority is distributed across mutually reinforcing institutions, each exercising responsibilities appropriate to its comparative competence. Such an arrangement reflects the principles of polycentric governance, whereby multiple centres of decision-making cooperate within an integrated constitutional framework while remaining accountable for clearly defined public functions (Ostrom, Tiebout and Warren, 1961).

Administrative effectiveness should therefore be assessed not by the number of federal units created but by their capacity to deliver public goods, coordinate development, strengthen democratic participation, maintain fiscal sustainability, and improve the quality of life of citizens. Experience from many developing and post-conflict countries suggests that excessive territorial fragmentation frequently increases administrative costs without corresponding improvements in governance or development (Collier, 2007). The future federal structure should consequently remain sufficiently flexible to evolve in response to demographic change, economic transformation, and practical experience while remaining guided by the overarching objectives of Recovery from Below and national renewal.

Fiscal Federalism for Democratic Recovery

A federal constitution cannot function effectively without a coherent system of fiscal federalism. The distribution of political authority must therefore be accompanied by an equally clear distribution of financial responsibilities. Fiscal arrangements determine whether constitutional decentralisation becomes meaningful in practice or remains an administrative formality.

One of the principal lessons emerging from Sudan's constitutional experience is that decentralisation without fiscal autonomy creates dependency rather than self-government. Although states and local governments have frequently been assigned extensive responsibilities, they have rarely possessed sufficient financial resources to discharge them effectively. Consequently, decentralisation often became administrative in form but highly centralised in practice (Geneif, 2026a).

Recovery from Below therefore proposes a model of *development-oriented fiscal federalism* founded upon transparency, equity, accountability, subsidiarity, and national solidarity. Financial resources should follow constitutional responsibilities. Each level of government should possess clearly defined revenue

sources, expenditure responsibilities, and mechanisms of public financial accountability, thereby reducing duplication, uncertainty, and political bargaining (Fukuyama, 2004; Ostrom, Tiebout and Warren, 1961).

The Federal Government should retain responsibility for revenue sources requiring macroeconomic coordination, including customs duties, corporate taxation, major natural-resource revenues, international borrowing, and national infrastructure financing. These revenues should support constitutional functions while also financing equitable transfers to federal regions or states.

Regional governments should receive constitutionally guaranteed revenue through transparent, formula-based intergovernmental transfers reflecting objective criteria such as population, poverty, geographical area, infrastructure deficits, environmental vulnerability, and post-conflict recovery needs. Such equalisation mechanisms would reduce long-standing regional disparities while ensuring that all citizens enjoy comparable standards of public services irrespective of their place of residence. Equalisation grants should therefore become instruments of national cohesion rather than political patronage.

The Smart Locality should constitute the principal operational unit of public expenditure. Predictable financial allocations should enable Smart Localities to coordinate Primary Health Care, basic education, agricultural extension, water and sanitation, environmental management, digital connectivity, local infrastructure, disaster preparedness, and community development. Stable financing at locality level would permit medium-term planning while strengthening accountability between elected representatives and citizens.

Village Councils should likewise possess limited but meaningful financial authority. Local revenues generated through community contributions, cooperative enterprises, locally authorised service charges, and other lawful sources should complement constitutionally guaranteed intergovernmental transfers. Community resources should remain subject to transparent public management and be used exclusively for priorities approved through democratic participation.

Clear expenditure responsibilities are equally important. The Federal Government should finance national defence, foreign affairs, constitutional institutions, macroeconomic management, strategic infrastructure, and national regulatory functions. Regional governments should oversee regional planning, specialised health services, universities, major transportation systems, environmental management, and regional economic development. Smart Localities should coordinate integrated community services, while Village Councils should support neighbourhood improvements, civic participation, and community mobilisation.

Fiscal accountability constitutes the indispensable counterpart of fiscal decentralisation. Independent auditing, transparent procurement, digital financial management systems, parliamentary oversight, and regular public reporting should

become mandatory at every level of government. Citizens should enjoy timely access to budget information, while public expenditure should be monitored not only through formal audit institutions but also through community participation.

Recovery from Below therefore advocates *community budgeting* as a core democratic practice within every Smart Locality. Participatory budgeting enables citizens to discuss development priorities, review expenditure proposals, monitor implementation, and evaluate completed projects through structured public consultations. Such processes strengthen democratic accountability while ensuring that public expenditure reflects locally identified priorities rather than exclusively administrative preferences. Participatory budgeting also reinforces the principles of polycentric governance by locating financial decision-making as close as practicable to citizens while maintaining accountability within the wider constitutional framework (Ostrom, 1990; Ostrom, Tiebout and Warren, 1961).

Fiscal federalism should consequently be understood not merely as a mechanism for distributing public revenue but as one of the principal instruments through which democratic governance, equitable development, institutional accountability, and national recovery are achieved.

The Smart Governance Architecture

Within the Sudan National Recovery and Reconstruction Framework, governance is conceived as an integrated **polycentric** system in which multiple institutions exercise complementary rather than competing responsibilities. Instead of concentrating authority within a single administrative hierarchy, governance is distributed across interconnected levels operating from the community to the national state. Each level performs those responsibilities that can be undertaken most effectively, efficiently, and democratically while cooperating closely with the others (Ostrom, Tiebout and Warren, 1961).

The Smart Locality: The Operational Engine of Recovery

Between the democratic village and the strategic regional government lies the **Smart Locality**, the principal operational unit of the Recovery from Below doctrine. Whereas the village constitutes the foundation of democratic citizenship and community participation, the Smart Locality provides the institutional capacity required to transform local priorities into coordinated programmes of recovery and development.

The Smart Locality links democratic village governance with regional planning, public administration, Primary Health Care, education, agricultural extension, environmental management, disaster preparedness, digital infrastructure, fiscal management, and local economic development. It serves as the principal interface between communities and higher levels of government, ensuring that national policies are adapted to local circumstances while community priorities inform regional and national planning.

Unlike conventional local government, which frequently functions as an administrative extension of central authority, the Smart Locality operates simultaneously as an administrative, developmental, knowledge, and governance platform. It integrates public services, coordinates community initiatives, mobilises local resources, supports evidence-based planning, and strengthens democratic accountability across clusters of villages.

Within the Sudan National Recovery and Reconstruction Framework, the Smart Locality therefore becomes the principal engine through which recovery is implemented, monitored, evaluated, and continuously improved. The governance hierarchy thus becomes clear.

The **Village** remains the fundamental democratic unit where citizens deliberate, elect representatives, identify priorities, monitor public services, and participate directly in community affairs. Clusters of villages constitute **Smart Localities**, which coordinate integrated service delivery and local development. Administratively viable **federal regions or states** provide strategic planning, regional infrastructure, specialised health services, higher education, environmental management, and economic coordination. The **Federal Government** retains responsibility for constitutional governance, national defence, foreign affairs, macroeconomic management, monetary policy, strategic infrastructure, and national regulatory standards.

Each level strengthens the others. None functions effectively in isolation. Together they create a governance system that combines democratic participation, administrative efficiency, institutional resilience, and constitutional coherence.

The Pillars of Democratic Governance for National Recovery

The governance architecture proposed in this chapter rests upon ten mutually reinforcing pillars that together provide the constitutional and institutional foundation for Sudan's recovery and long-term democratic renewal.

- The first pillar is **equal citizenship**. Every Sudanese citizen should enjoy equal constitutional rights and responsibilities irrespective of ethnicity, religion, language, gender, geographical origin, or political affiliation. Equal citizenship should become the foundation of the constitutional order, replacing systems based upon exclusion, patronage, or identity-based political privilege.
- The second pillar is **democratic participation**. Democracy should extend beyond periodic elections to become a continuous process of civic engagement. Citizens should participate actively through Village Councils, Smart Localities, professional associations, civil society organisations, women's groups, youth organisations, and digital platforms for public consultation and accountability.
- The third pillar is the **rule of law**. Independent courts, impartial

judicial institutions, accountable policing, constitutional review, and equal access to justice are indispensable foundations of democratic governance. Constitutional rights should be protected consistently throughout the country irrespective of political circumstance.

- The fourth pillar is **transparency and accountability**. Public institutions should operate under independent auditing, parliamentary oversight, transparent procurement, digital financial management systems, freedom of information, and regular public reporting. Accountability should extend beyond formal institutions to include community monitoring and citizen participation.
- The fifth pillar is **subsidiarity**. Public responsibilities should always be exercised at the lowest competent level of government. Matters capable of being managed effectively by communities should remain within communities. Higher levels of government should intervene only where coordination, scale, technical complexity, or constitutional responsibility require broader authority.
- The sixth pillar is **human security**. Governance should safeguard not only territorial integrity but also health, education, food security, environmental sustainability, livelihoods, social protection, and public safety. Within Recovery from Below, Primary Health Care therefore becomes both a health strategy and an institution of democratic governance.
- The seventh pillar is **Knowledge Sovereignty**. Sustainable governance depends upon evidence-informed policymaking, scientific research, universities, indigenous knowledge systems, digital information systems, and continuous institutional learning. Knowledge should become one of Sudan's principal strategic resources for national recovery.
- The eighth pillar is **inclusive economic development**. Governance should facilitate productive local economies rather than political patronage. Agriculture, livestock, fisheries, manufacturing, cooperatives, renewable energy, digital enterprise, and small and medium-sized businesses should become engines of broad-based economic recovery.
- The ninth pillar is **environmental stewardship**. Climate resilience, watershed management, biodiversity conservation, renewable energy, sustainable agriculture, and responsible natural-resource management should be integrated into every level of governance. Environmental sustainability is increasingly inseparable from long-term human security.
- The tenth pillar is **unity through diversity**. Sudan's cultural, linguistic, religious, ecological, and regional diversity should be recognised as a national asset rather than a source of political division. Democratic governance should strengthen shared citizenship while respecting

- legitimate diversity within a common constitutional framework.
- Together these pillars establish a governance system capable of supporting democratic recovery, institutional resilience, and sustainable national development.

Policy Priorities for Constitutional Reconstruction

The reconstruction of Sudan requires more than drafting a new constitution. It requires the deliberate creation of institutions capable of preventing the recurrence of state fragility, political exclusion, fiscal mismanagement, and violent conflict. Constitutional reform should therefore be approached as a phased process of democratic institution-building rather than as a single political event.

- The first priority should be the restoration of constitutional government founded upon democratic legitimacy, separation of powers, judicial independence, civilian oversight of the security sector, equal citizenship, and the rule of law.
- Second, local government should become the principal arena of democratic participation. Village Councils and Smart Localities should be established as elected institutions possessing clearly defined constitutional responsibilities, predictable financial resources, and effective mechanisms of public accountability.
- Third, Sudan should undertake an independent constitutional review of its territorial organisation with the objective of establishing the minimum number of administratively viable and economically sustainable federal regions or states capable of supporting effective governance and balanced development.
- Fourth, comprehensive fiscal federalism should accompany constitutional decentralisation. Transparent revenue assignment, formula-based intergovernmental transfers, equalisation mechanisms, participatory budgeting, and independent financial oversight should become constitutional requirements rather than discretionary administrative practices.
- Fifth, governance should progressively become digital. Digital public administration improves transparency, facilitates citizen participation, strengthens financial accountability, enhances service delivery, and provides reliable evidence for planning and monitoring. Every Smart Locality should therefore become progressively integrated within a national digital governance platform.
- Finally, constitutional reconstruction should recognise that governance cannot be separated from education, public health, environmental sustainability, knowledge generation, economic development, and community resilience. Recovery succeeds when institutions operate as

components of an integrated system rather than isolated administrative sectors.

Governance within the Sudan National Recovery and Reconstruction Framework

Within the Sudan National Recovery and Reconstruction Framework, governance provides the institutional architecture through which all sectors of recovery are coordinated. It should therefore be understood not as a separate governmental function but as the enabling system through which reconstruction becomes coherent, accountable, and sustainable.

- Primary Health Care becomes both a health intervention and a governance institution by strengthening community participation, disease surveillance, human security, and public accountability.
- Education becomes both a social service and a democratic institution by cultivating informed citizenship, critical thinking, civic responsibility, and lifelong learning.
- Agriculture becomes an economic, environmental, and governance priority because productive livelihoods strengthen political stability, food security, and community resilience.
- Knowledge systems—including universities, research centres, indigenous knowledge, digital information systems, and professional expertise—become governance assets by supporting evidence-based policymaking and institutional learning.
- Environmental stewardship likewise becomes a constitutional responsibility because climate resilience, biodiversity conservation, water security, and sustainable natural-resource management increasingly determine long-term human wellbeing.
- The Smart Village Network provides the operational mechanism through which these sectors become integrated at the community level. Governance therefore ceases to function through isolated ministries and instead operates through coordinated systems serving common national objectives.

Conclusion

The governance challenge confronting Sudan has fundamentally changed. Previous constitutional debates focused principally upon the distribution of political authority between the centre and the periphery. Although these questions remain important, the devastation caused by the war of April 2023 requires a broader constitutional vision. Sudan must rebuild not only its institutions but also the relationship between citizens, communities, and the state.

This chapter has argued that democratic recovery requires governance

founded upon capable institutions, active citizenship, accountable public administration, fiscal responsibility, constitutional justice, and resilient communities. Federalism remains an important constitutional principle, but its effectiveness depends less upon the number of administrative units than upon the quality of governance they deliver.

Recovery from Below therefore proposes a governance system in which the citizen becomes the starting point of democratic life. Village Councils provide the foundation of participation. Smart Localities become the operational engines of recovery. Administratively viable federal regions or states provide strategic planning and regional coordination. The Federal Government safeguards constitutional unity, macroeconomic stability, national security, foreign relations, and national standards. Authority is exercised according to constitutional competence, while cooperation replaces competition among institutions.

The governance system proposed in this chapter represents far more than an administrative reform. It constitutes a new constitutional philosophy founded upon democratic citizenship, community resilience, institutional integrity, fiscal responsibility, human security, and accountable public institutions. Rather than rebuilding the Sudanese state from the capital downward, it rebuilds the Republic from its citizens, communities, villages, and localities upward. Within this architecture, the Sudan National Recovery and Reconstruction Framework, the Smart Village Network, and the Smart Locality become mutually reinforcing mechanisms through which governance is translated into tangible improvements in people's lives. Recovery from Below thus transforms governance from an instrument of political control into an instrument of democratic participation, equitable development, and national renewal.

In the New Sudan, the strength of the Republic will no longer be measured by the power of its centre, but by the vitality of its communities, the integrity of its institutions, and the active citizenship of its people.

Policy Box

Governance Priorities for National Recovery

Following the restoration of constitutional order, Sudan should prioritise:

1. Restoring democratic constitutional government founded upon the rule of law and equal citizenship.
2. Establishing independent institutions for transitional justice, judicial reform, and civilian oversight of the security sector.
3. Rationalising the federal structure by establishing the minimum number of administratively viable and economically sustainable federal regions or states capable of supporting effective governance and balanced national development.
4. Strengthening elected Village Councils and establishing Smart Localities as the principal operational units of recovery.
5. Introducing transparent fiscal federalism based on formula-driven transfers, equalisation grants, and participatory budgeting.
6. Restoring Primary Health Care as the institutional nucleus of community governance and human security.
7. Building integrated digital governance systems that improve accountability, service delivery, and evidence-based planning.
8. Embedding Knowledge Sovereignty, environmental stewardship, and community participation within every level of public administration.
9. Implementing the Sudan National Recovery and Reconstruction Framework through the Smart Village Network.
10. Promoting democratic citizenship as the enduring foundation of national recovery and renewal.

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PART III

REBUILDING HUMAN SYSTEMS: HEALTH, EDUCATION, AND SOCIAL INFRASTRUCTURE

CHAPTER 7

HEALTH AT THE FRONTLINE OF RECOVERY

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Sudan's health system collapse is best understood as a historically produced condition rather than the outcome of isolated shocks or the 2023 war alone. Since the post-2005 period, repeated cycles of conflict and coercive political settlements have interacted with uneven state formation and contested centre-periphery relations to erode the institutional foundations of public service provision, including health services. Comparative evidence from fragile and conflict-affected settings shows that protracted violence does not merely disrupt services episodically; it progressively degrades the "system functions" that generate resilience, stewardship, financing, workforce governance, information, and accountability, thereby converting acute crises into chronic failure states (Blanchet et al., 2017; Witter et al., 2017; Kruk et al., 2015; Truppa et al., 2024). In Sudan, this long arc of institutional weakening helped normalise humanitarian substitution and fragmented governance arrangements, creating a health sector that operated as a hybrid assemblage of partial public authority, vertical programming, and externalised delivery rather than as a coherent national system capable of learning, adaptation, and risk management (Kruk et al., 2015; Truppa et al., 2024). This chapter is about rebuilding Sudan's health system for security, resilience, and peace.

Box 1. The Human Cost of Systemic Collapse: Sudan's Crisis in Numbers (2023–2025)

Mass Forced Displacement

- More than **11.5 million internally displaced persons (IDPs)** across Sudan.
- Over **3.2 million cross-border refugees and returnees**.
- Major destinations include:
 - **Egypt:** more than 1.2 million people.
 - **Chad:** more than 720,000 people.
 - **South Sudan:** more than 700,000 returnees and refugees.

Mortality and Violence

- Estimated **28,000–30,000 direct conflict deaths** nationwide.
- Research estimates suggest **more than 61,000 all-cause deaths in Khartoum State alone** during the first 14 months of war, indicating substantial under-reporting of the national death toll.
- More than **150 verified attacks on healthcare facilities**.
- Dozens of health workers killed.
- Widespread looting and destruction of specialised medical centres and hospitals.

Food Insecurity and Famine

- Approximately **25.6 million people** facing acute food insecurity (**IPC Phase 3 or higher**), representing more than half of Sudan's population.
- **Famine conditions confirmed in Zamzam Camp (North Darfur)**.
- At least **14 additional areas** assessed as being at immediate risk of famine.

Epidemiological Breakdown

- More than **60,000 suspected cholera cases** and over **1,600 reported deaths** across 11 states by April 2025.
- Approximately **2 million children** missed essential vaccinations.
- Re-emergence of vaccine-preventable diseases, including **measles** and **polio**.

Collapse of Health Protection Systems

- Severe disruption of routine primary health care services.
- Breakdown of surveillance, laboratory, and referral systems in multiple states.
- Large-scale interruption of maternal, child health, and immunisation programmes.
- **Sources:** Compiled from United Nations Office for the Coordination of Humanitarian Affairs (2024; 2025), United Nations High Commissioner for Refugees (2024), World Health Organization (2024; 2025), and London School of Hygiene & Tropical Medicine Sudan Research Group (2024).

Fiscal contraction, austerity, and the erosion of public health capacity

A major inflection in this trajectory followed the fiscal rupture associated with the post-2011 macro-political settlement, which intensified austerity dynamics and constrained the state's capacity to maintain the public sector wage bill, invest in infrastructure, and sustain core public health functions. Political-economy analyses describe how fiscal volatility and monetised governance priorities can crowd out social spending and accelerate institutional decay, especially where financing is not protected by stable pooling mechanisms or credible accountability (Verhoeven, 2019). In the health sector, empirical work on Sudan's financing profile highlights the structural consequences of such contraction: persistent under-investment in public provision, rising reliance on out-of-pocket expenditure, and deepening inequity in access as households absorb a growing share of system costs (Awad et al., 2021). Over time, these dynamics weakened the state's ability to provide predictable services and undermined the institutional prerequisites for preparedness, laboratory networks, surveillance functionality, and a stable health workforce, long before the current war made the breakdown visible at scale.

Political Rupture, Institutional Discontinuity, and System Paralysis

The 2019 revolution briefly reopened a policy window for renewal, including reform agendas oriented toward primary health care, financing, and system stewardship. However, the reversal of the transition following the 2021 coup is widely interpreted as a moment of institutional discontinuity that disrupted policy direction, administrative coherence, and external financing relationships. Analyses of Sudan's transition underscore how an abrupt political rupture translates into governance paralysis across social sectors, driven by leadership turnover, weakened policy authority, and fragmented coordination with partners and subnational administrations (El-Gizouli and Siddig, 2022).

In fragile settings, this type of discontinuity is not a background variable; it directly shapes system performance by disrupting the continuity of rules, incentives, and institutional memory required for reform implementation and routine oversight (Blanchet et al., 2017; Witter et al., 2017). When large-scale war erupted in April 2023, it did not create fragility from scratch; rather, it acted as an accelerant that exposed the cumulative vulnerabilities of an over-centralised, fiscally brittle, and institutionally fragmented health system, one whose apparent functionality depended on a fragile political order and uninterrupted central nodes. Peer-reviewed analyses of the current conflict describe how the destruction of infrastructure, interruption of supply chains, and displacement of the workforce rapidly translated into system-wide paralysis precisely because integrative governance and redundancy mechanisms were already weak (Dafallah et al., 2023; Elamin et al., 2024).

Conflict, Displacement, Environmental Stress, and the Conversion of Shocks into Chronic Failure

A defining feature of Sudan's recent trajectory is the interaction between conflict, displacement, and environmental stress, which together intensify disease risk while overwhelming weakened municipal and public health functions. Evidence from fragile and conflict-affected contexts shows that when service platforms fracture and population movement becomes sustained, outbreak risk is amplified not only by exposure and crowding but also by the collapse of routine prevention, environmental health management, and surveillance feedback loops, conditions that turn predictable hazards into recurrent emergencies (Blanchet et al., 2017; Dafallah et al., 2023).

Therefore, repeated epidemics in Sudan should be read less as discrete epidemiological “events” than as systemic signals of governance failure across health, local administration, and environmental management, reflecting fragmentation, weak accountability, and declining institutional trust rather than merely technical gaps. Recent peer-reviewed assessments of Sudan's health sector under conflict describe exactly this pattern; the compounding of service disruption, weakened public health functions, and deteriorating local systems in ways that sustain humanitarian dependence and perpetuate risk (Dafallah et al., 2023; Elamin et al., 2024).

Health, Legitimacy, and the Broken Social Contract

Health systems in fragile settings are not only service delivery mechanisms; they are social institutions that mediate state–society relations and shape perceived legitimacy. Classic and contemporary scholarship shows that trust in health care institutions, and the experience of fairness, reliability, and responsiveness, function as a core pathway through which health systems contribute to social cohesion, while persistent exclusion and service collapse reinforce grievance and political instability (Gilson, 2003).

Political-economy perspectives further argue that where governance resembles “developmental patrimonialism” or other personalised settlement forms, health system performance becomes tightly linked to the credibility of state authority and the distributional politics of access, with service failure acting as both a symptom and a driver of fragility (Kelsall and Booth, 2010). In Sudan, the cumulative effects of workforce attrition, service collapse, and humanitarian substitution have progressively weakened the social contract role of the health sector, with institutional absence communicated through the daily realities of inaccessible care and recurrent epidemics rather than through formal policy statements.

Reframing Recovery: Institutional Transformation, Evidence, and Health Sovereignty

This structural diagnosis establishes the analytic baseline for the chapter by demonstrating that Sudan's health system collapse is path-dependent and institutionally produced, shaped by protracted conflict, fiscal volatility, political discontinuity, and the compounding effects of displacement and environmental stress. It also clarifies why recovery cannot mean restoration of the pre-war status quo: where fragility is structurally embedded, rebuilding must be oriented toward institutional transformation rather than administrative repair. This framing sets the logic for subsequent analysis by positioning health system recovery as resilience infrastructure through governance, decentralisation, financing, and environmental integration, and by operationalising these foundations through epidemic intelligence and IHR-aligned health security capacities. A final conceptual implication is that "evidence sovereignty", the ability of national institutions to generate, govern, and use health intelligence, should be treated as a core component of state capability rather than a technical add-on, consistent with recent peer-reviewed arguments on re-centring country ownership within the global evidence ecosystem for health (Kuchenmüller et al., 2025).

Building on this, health sovereignty emerges as a necessary extension of evidence sovereignty and a central organising principle for post-crisis recovery. In fragile and conflict-affected settings, where external actors have historically substituted for weakened state functions, recovery must be understood not only as restoring services but as reconstituting authority over the core functions of the health system—priority setting, resource allocation, regulation, and accountability. Health sovereignty, therefore, reflects the capacity of the state to exercise effective stewardship while engaging external partners within nationally defined frameworks. This shift is essential for a transition from fragmented, donor-driven interventions toward a coherent, nationally owned recovery trajectory aligned with International Health Regulations (2005) obligations, Universal Health Coverage commitments, and broader health security agendas (World Health Organization, 2016; World Bank, 2011).

The reconstruction of governance architecture is the primary mechanism through which health sovereignty is operationalised. Post-crisis environments require deliberate institutional redesign to address entrenched distortions, including over-centralisation, weak subnational authority, and the proliferation of parallel systems established through humanitarian response. Governance reshaping must therefore prioritise decentralised yet coordinated models, redistributing decision-making authority to state and locality levels while maintaining strong national policy coherence, regulatory oversight, and accountability. This includes establishing functional public health institutes, integrated surveillance and epidemic intelligence systems, and legally grounded coordination platforms that align emergency response, routine service delivery,

and long-term system development. Without such institutional recalibration, recovery risks reproduce the very governance failures that underpinned system collapse (Blanchet et al., 2017; Kruk et al., 2015; Organisation for Economic Co-operation and Development, 2022).

Looking forward, the role of health sovereignty in shaping resilient health systems is inseparable from broader processes of state-building and social contract renewal. It provides a strategic entry point to reposition health as a core component of national security, economic recovery, and political legitimacy. Operationally, this requires embedding governance reforms within wider frameworks of fiscal decentralisation, legal reform, and multisectoral coordination, particularly through One Health and Health in All Policies approaches. By anchoring recovery in sovereign governance structures that are adaptive, accountable, and intelligence-driven, countries can transition from crisis response to resilience-building, ensuring that future shocks are absorbed without systemic breakdown while reinforcing compliance with international obligations and restoring public trust (Paquet et al., 2006; Food and Agriculture Organization of the United Nations et al., 2019; World Bank, 2011).

Box 2: Health Sovereignty

- Refers to the capacity of national institutions to govern, finance, regulate, and coordinate the health system according to national priorities.
- Encompasses control over core health system functions, including:
 - health policy formulation,
 - resource allocation,
 - service delivery,
 - health system regulation,
 - coordination of external actors,
 - generation and use of health intelligence.
- Requires the existence of a coherent national framework capable of integrating public, private, humanitarian, and international actors.
- Emerged as a response to fragmented and donor-driven health systems, particularly in fragile and conflict-affected settings.
- Recognises that prolonged humanitarian substitution for state functions can:
 - create parallel systems,
 - weaken institutional authority,
 - undermine long-term national capacity,
 - distort national priorities.
- Emphasises national ownership as a prerequisite for sustainable health system development and resilience.
- Reinforced by recent global health frameworks and lessons from the COVID-19 pandemic.
- Highlights that effective health security depends on domestic capability to:
 - manage health risks,
 - maintain essential services during crises,
 - generate and act upon health intelligence,
 - coordinate emergency preparedness and response.
- Links health sovereignty to broader concepts of:
 - institutional resilience,
 - strategic autonomy,
 - public accountability,
 - human security,
 - national recovery and reconstruction.

Rebuilding Epidemic Intelligence as a Core Function of Recovery, Resilience, and Security

Against this structural backdrop, the reconstruction of epidemic intelligence in Sudan emerges not as a technical subdomain but as a core governance and

systems function underpinning national and regional health security. Anchored in the International Health Regulations (2005), epidemic intelligence includes the recovery and performance of indicator- and event-based surveillance, early warning systems, laboratory and specimen transport networks, emergency operations centres, and rapid response capacity within a fragile, decentralised, and environmentally stressed context.

Building directly on institutional foundations, epidemic intelligence is inseparable from the recovery of decentralised authority, interoperable digital systems embedded in primary health care, community-based detection, One Health coordination, and environmental monitoring. Surveillance is therefore treated not as a discrete technical activity, but as an expression of governance that links information to decision-making, accountability, and public trust. Institutionalising these capacities transforms surveillance from a fragile, emergency-driven instrument, reflective of broader institutional collapse, into a durable pillar of health system resilience and national security, capable of preventing localised shocks from escalating into systemic crises (Kruk et al., 2015; Verhoeven, 2019).

Integrating Indicator-Based and Event-Based Surveillance

Rebuilding epidemic intelligence in Sudan requires reconstituting an integrated surveillance architecture that deliberately combines indicator-based surveillance (IBS) and event-based surveillance (EBS) within a unified, International Health Regulations (2005)-aligned framework. IBS has historically underpinned national systems through structured reporting from facilities and sentinel sites, enabling trend analysis, burden estimation, and threshold-based outbreak detection. In Sudan, it evolved through facility and sentinel platforms and was formalised under Integrated Disease Surveillance and Response (IDSR).

EBS complements these structural limits by capturing unstructured signals—community alerts, rumours, media reports, unusual clusters, unexplained deaths, and animal die-offs—often identifying threats before they appear in routine data. Under the IHR, it is central to early detection, verification, and risk assessment, particularly for zoonotic and unknown hazards (Kruk et al., 2015). Sudan had established EBS prior to the conflict within the Health Emergency and Epidemic Control (HEEC) Directorate, designed to complement—not replace—IBS.

The 2023 conflict disrupted both systems but exposed their asymmetrical fragility. IBS deteriorated sharply as facilities closed, communications collapsed, and the workforce was displaced; by early 2025, fewer than 40% of sentinel sites remained functional. This confirms that IBS alone cannot sustain epidemic intelligence under protracted insecurity. Digital transformation offers a recovery pathway: evidence from Sierra Leone shows that electronic IDSR via DHIS2 improved timeliness, completeness, and data use, reaching ~95% facility coverage

and capturing ~80% of priority cases by 2022. Sudan can adapt similar mobile and web-based approaches to restore routine surveillance while reducing dependence on paper systems.

EBS remains indispensable in fragile, decentralised settings. Its adaptive design enables detection through community and multisectoral networks. Afghanistan's COVID-19 experience demonstrated its value, where transmission was first identified through non-facility signals when formal systems were overwhelmed. Sudan has comparable latent capacity through civic networks such as Nafeer groups. Institutionalising these within formal EBS pathways—linked to verification and response mechanisms—would strengthen early detection, reinforce state–community trust, and ensure alignment with IHR priorities for zoonotic, food-borne, and water-borne risks (Kruk et al., 2015; Verhoeven, 2019; Kuchenmüller et al., 2025).

One Health, Environmental, and Vector Surveillance Integration

Integrating indicator- and event-based surveillance must extend to veterinary, environmental, and vector systems to operationalise a One Health approach aligned with Sudan's epidemiological realities. Zoonotic diseases and climate-sensitive vectors remain recurrent threats amplified by displacement, flooding, and environmental degradation. Under the IHR (2005), surveillance of animal and environmental events is integral to national detection and risk assessment capacity (Kruk et al., 2015).

Veterinary surveillance and laboratory systems should therefore be systematically integrated into epidemic intelligence, with animal morbidity and mortality signals feeding directly into event-based surveillance and linked to joint verification and referral pathways. The Quadripartite One Health guidance underscores that early detection depends on interoperable surveillance, shared risk assessment, and coordinated multisectoral response (Kuchenmüller et al., 2025; Cashin, 2022). In Sudan, rebuilding joint platforms and laboratory linkages is essential for restoring IHR compliance.

Vector surveillance represents a critical gap and must be climate-informed. Entomological indicators—vector density, breeding indices, and resistance—provide early signals of risk, but require integration with climatic drivers such as temperature, rainfall, flooding, and humidity, which shape vector dynamics and transmission patterns (World Health Organization, 2022; World Health Organization, 2023).

Operationally, epidemic intelligence should treat climate variables as routine surveillance inputs, analysed alongside entomological and syndromic data to anticipate outbreaks of malaria, dengue, and other climate-sensitive diseases, particularly during displacement and service disruption (World Health Organization, 2022; World Health Organization, 2023; Paquet et al., 2006; World Health Organization, 2016). This is strengthened through geospatial tools, remote

sensing, and AI-supported risk modelling, enabling targeted interventions and anticipatory action while remaining anchored in nationally governed systems (Paquet et al., 2006; Buehler et al., 2003; Mordecai et al., 2019; World Health Organization, 2023). Water quality surveillance further complements this system by generating early alerts for cholera and other diarrhoeal diseases, particularly in flood-prone settings (World Health Organization, 2022; World Health Organization, 2023; Paquet et al., 2006; Buehler et al., 2003).

Effective integration ultimately depends on joint human–animal–environment verification and response teams operating at decentralised levels under unified protocols and coordinated through emergency operations centres. By embedding One Health within governance structures, Sudan can transform fragmented data into coherent epidemic intelligence, strengthening response, accountability, and public trust (Kuchenmüller et al., 2025; Cashin, 2022; Newbrander et al., 2014).

Multisectoral, Cross-Border, and Municipal Governance as Epidemic Intelligence Infrastructure

Strengthening epidemic intelligence in Sudan requires consolidating multisectoral and cross-border governance beyond the health sector. The Federal Ministry of Health has advanced a One Health approach through a dedicated Directorate and coordination with veterinary sectors, marking a shift from ad hoc collaboration to structured governance. Under the International Health Regulations (2005), integrating human, animal, and environmental intelligence is essential for detecting zoonotic and climate-driven risks. Consolidating mandates, aligning laboratory reporting, and institutionalising joint risk assessment are therefore central to rebuilding epidemic intelligence as a whole-of-government function (Kruk et al., 2015; Kuchenmüller et al., 2025).

This architecture must also extend regionally. Population movement, pastoral mobility, and porous borders make national surveillance insufficient. Sudan's commitments under the Khartoum Declaration (2018) provide a basis for cross-border cooperation, enabling timely information-sharing, harmonised standards, and coordinated responses to transboundary threats such as cholera, measles, and zoonoses. From an IHR perspective, such collaboration is essential for collective risk management and regional stability (Kruk et al., 2015; Verhoeven, 2019).

At subnational level, restoring municipal functions is equally critical. The collapse of waste management, drainage, vector control, and market inspection during the conflict directly contributed to outbreaks of cholera, dengue, and malaria. Rebuilding epidemic intelligence therefore requires reintegrating environmental surveillance—vector monitoring, water quality, and waste systems—into national platforms, creating an upstream layer of detection linked to health systems (World Health Organization, 2022; World Health Organization, 2023; Paquet et al., 2006; World Health Organization, 2015).

Together, strengthened One Health coordination, cross-border surveillance, and municipal environmental intelligence reposition epidemic intelligence as a decentralised, multisectoral system of risk governance. This expands detection capacity, enables anticipatory response, and reinforces state legitimacy while aligning with IHR requirements in a fragile context (Paquet et al., 2006; Kuchenmüller et al., 2025; Cashin, 2022).

Early warning systems as adaptive infrastructure

Early warning systems are built on the integration of indicator-based, event-based, and One Health surveillance streams, translating diverse data into actionable alerts through thresholds, algorithms, and contextual risk assessment. Under the International Health Regulations (2005), they operationalise core capacities for detection, verification, and notification by converting routine data, community signals, laboratory results, and environmental indicators into timely decision triggers (Newbrander et al., 2014; El-Jardali et al., 2018; Food and Agriculture Organization of the United Nations et al., 2019).

In Sudan, early warning historically relied on routine indicator-based reporting, which proved inadequate during the conflict due to delays, incomplete data, and collapsing service coverage. Crisis-adapted systems such as WHO's EWARS restored minimum alerting capacity by prioritising timeliness, simplified case definitions, and direct linkage to response, preserving essential IHR functions in disrupted settings (Gilson, 2003).

However, EWARS should not remain a parallel system. Its long-term value lies in phased integration into nationally governed platforms—particularly DHIS2, routine health information systems, and laboratory networks—to restore data sovereignty, institutional ownership, and system coherence. This transition must preserve alerting capacity while progressively transferring governance and financing to national institutions.

Effectiveness depends on decentralised response authority. Linking alerts to state and district structures, emergency operations centres, and rapid response teams ensures timely containment rather than passive reporting. Integrating climate and environmental data further enables anticipatory action for epidemics such as cholera, malaria, and dengue (World Health Organization, 2022; World Health Organization, 2023; Organisation for Economic Co-operation and Development, 2022).

Laboratory and Specimen Transport Networks as the Diagnostic Spine of Epidemic Intelligence

Laboratory systems are a core pillar of epidemic intelligence, providing diagnostic confirmation and pathogen characterisation essential for credible risk assessment under the International Health Regulations (2005). In Sudan, loss of access to the National Public Health Laboratory after the 2023 conflict created a major

diagnostic gap, weakening surveillance sensitivity and forcing reliance on syndromic signals, with increased risk of misclassification and delayed response (Kruk et al., 2015; Elamin et al., 2024; Salehi et al., 2018).

Emergency decentralisation—such as upgrading the Port Sudan Public Health Laboratory—partially restored diagnostic capacity, reflecting pragmatic crisis adaptation. Similar approaches in post-Ebola settings show that decentralised laboratory functions can sustain outbreak confirmation if embedded within governance and quality assurance systems. However, such measures remain fragile without transition into a coherent national laboratory policy and sustainable financing framework (Elamin et al., 2024; World Health Organization, 2023).

Long-term recovery requires rebuilding a tiered laboratory network: peripheral laboratories for essential diagnostics, regional hubs for confirmatory testing and surge capacity, and a national reference function for quality assurance, genomic surveillance, and coordination. This system must be supported by reliable specimen transport networks, which are critical for timely confirmation and often more limiting than laboratory capacity itself in fragile contexts (Kruk et al., 2015; Salehi et al., 2018). Nonetheless, laboratory recovery must also be One Health-oriented. Integrating human, veterinary, and environmental laboratories, with harmonised standards and shared referral systems, is essential for detecting zoonotic and environmental risks, consistent with IHR and Quadripartite guidance (Kuchenmüller et al., 2025; Cashin, 2022; Newbrander et al., 2014; Salehi et al., 2018).

From a governance perspective, laboratories and specimen transport systems should be treated as core state functions. Embedding financing, workforce development, biosafety, and quality assurance within national recovery strategies restores data credibility and enables a timely, evidence-based response. In this sense, laboratory systems form the diagnostic backbone of epidemic intelligence and a prerequisite for resilient, IHR-compliant health security (Kruk et al., 2015; Salehi et al., 2018).

Emergency operations centres and rapid response capacity as the operational end of intelligence

Emergency operations centres (EOCs) are the institutional backbone of outbreak response, translating surveillance, laboratory data, and logistics into operational action. Evidence from Ebola settings shows they are most effective when decentralised, empowered, and embedded within national command structures that balance strategic oversight with operational autonomy (Elamin et al., 2024; World Health Organization, 2023; Paquet et al., 2006). In Sudan, strengthening EOCs must therefore align national coordination with subnational execution, ensuring timely response where outbreaks occur (Blanchet et al., 2017; Kruk et al., 2015).

Reform should clarify roles: the federal EOC focuses on national risk

assessment, IHR reporting, coordination, and technical oversight, while state-level EOCs function as operational hubs with authority to mobilise resources and deploy response in real time (Blanchet et al., 2017; El-Gizouli and Siddig, 2022). This division preserves coherence while enabling rapid, context-specific action, which is critical in fragile settings where delays amplify outbreaks (Elamin et al., 2024). Yet, decentralised response capacity is a functional necessity. State and locality EOCs require trained staff, access to surveillance and laboratory data, contingency financing, and logistical assets for immediate action without central approval. Pre-positioned funds, flexible procurement, and partner agreements are essential to sustain rapid response (Blanchet et al., 2017; Truppa et al., 2024; Awad et al., 2021).

Rapid response teams (RRTs) operationalise epidemic intelligence, translating alerts into field action. Multidisciplinary teams integrating epidemiology, clinical care, laboratory, veterinary, and environmental expertise are essential, particularly in Sudan's context of zoonotic and environmental risks (Kruk et al., 2015; Verhoeven, 2019; Kuchenmüller et al., 2025; Cashin, 2022). Community-based responders further extend reach in insecure and underserved areas. Integrating community health workers and volunteers into formal response systems enhances detection, case finding, and risk communication while reinforcing trust (Blanchet et al., 2017; El-Gizouli and Siddig, 2022; Gilson, 2003; Buehler et al., 2003).

Together, decentralised EOCs, strengthened RRTs, and community integration transform outbreak response from a centralised reporting function into a responsive, IHR-aligned system. This ensures surveillance leads to timely action, strengthens resilience, and rebuilds public trust in a fragile context (Blanchet et al., 2017; Kruk et al., 2015; Verhoeven, 2019; El-Gizouli and Siddig, 2022; Elamin et al., 2024).

Financing, Integration, and the Path Toward Sovereign Epidemic Intelligence

Sustainable integration of epidemic intelligence in Sudan requires disciplined financing and coordinated external support. While partners remain essential in recovery—particularly through platforms such as EWARS—long-term resilience depends on integrating externally supported systems into national governance, financing, and operations. This restores data sovereignty, reduces parallel systems, and aligns surveillance with national priorities (Blanchet et al., 2017; Gilson, 2003). COVID-19 experience in Sudan and the Eastern Mediterranean Region showed that weak domestic resource mobilisation led to prolonged transmission, service disruption, and declining surveillance performance and trust (World Health Organization, 2015; World Health Organization, 2020; Intergovernmental Panel on Climate Change, 2022).

Epidemic intelligence is not a stand-alone function but an outcome of functioning health systems. Its effectiveness depends on integration with service delivery, governance, and financing. Embedding surveillance within primary

health care, decentralised systems, environmental services, and national budgets transforms it into a durable public good. Digital platforms (e.g., DHIS2, EWARS) can unify data across sectors, but only where governance links information to authority, resources, and accountability (Blanchet et al., 2017; Kruk et al., 2015; Gilson, 2003; Kuchenmüller et al., 2025).

COVID-19 further exposed that fragmented governance and weak subnational capacity delay detection and disrupt services. In Sudan, underinvestment, workforce instability, and centralised decision-making limited continuity of epidemic intelligence during system shocks. Maintaining primary health care proved essential, as service disruptions reduced reporting completeness and delayed outbreak detection. This underscores the need for resilient systems that combine multiple data sources and enable decentralised action under disruption (Gilson, 2003; World Health Organization, 2015; World Health Organization, 2020).

Effective governance requires clear federal leadership with defined mandates for coordination, risk assessment, and IHR communication, alongside decentralised operational authority. Without this, surveillance data fail to translate into timely response (Kruk et al., 2015; World Health Organization, 2015; Abramowitz et al., 2015). States and localities must be empowered with financing and authority to act, avoiding the passive reporting observed during COVID-19 in resource-constrained settings (World Health Organization, 2020; Abramowitz et al., 2015).

Integration must also extend across sectors and borders. Institutionalised One Health coordination—linking public health, veterinary, environmental, and municipal systems—enables early detection of complex threats, while strengthening municipal functions (vector control, water safety, waste management) enhances upstream risk detection (Kuchenmüller et al., 2025; Cashin, 2022). Cross-border collaboration is equally critical, as mobility and porous borders require harmonised surveillance and timely information sharing to prevent regional amplification of risk (Kruk et al., 2015; Abramowitz et al., 2015).

Taken together, these reforms reposition epidemic intelligence as the connective infrastructure linking service delivery, environmental governance, decentralised authority, and national stewardship in line with IHR core capacities. When embedded within coherent governance and financing frameworks, surveillance becomes a durable state function—enabling timely detection, response, and sustained health system resilience while rebuilding trust and legitimacy in the context of a protracted crisis (Blanchet et al., 2017; Kruk et al., 2015; Gilson, 2003).

Table 1: Key Structural Requirements		
Pillar	Requirements	Purpose
Institutional	Legally mandated coordination	To avoid ambiguous or contested mandates during crisis.
Financial	Sustainable Domestic Financing	To end depending on volatiles vertical programs and donor manipulations through preserving sovereignty over health sector
Technical	Digital Backbone (i.e. Digitalisation)	To Unify data stream of different sectors and strengthening informed decision making
Geopolitical	Regional Frameworks	To manage transboundary threats and informal population movements.

Against this backdrop, this section advances the proposition that the health system constitutes a core component of national resilience infrastructure, whose reconstruction is inseparable from wider processes of governance reconstitution, social contract repair, and risk management. Rather than treating recovery as the sequential restoration of services, the section conceptualises health system rebuilding as a multidimensional political–institutional project encompassing stewardship, decentralisation, financing, service delivery, environmental governance, and societal participation.

It argues that these domains function as interdependent determinants of system absorptive, adaptive, and transformative capacities, shaping not only the continuity and equity of care but also the state’s ability to manage uncertainty and anticipate systemic threats. Thus, by interrogating how primary health care platforms, subnational authority, multisectoral coordination, private sector regulation, and community engagement interact under conditions of fragility, the section delineates the structural preconditions through which resilience is operationalised. These same configurations, in turn, define the institutional bandwidth, information flows, and decision authority upon which epidemic intelligence and health security depend, thereby establishing a necessary analytical bridge to the subsequent examination of surveillance, preparedness, and International Health Regulations–aligned capacities.

Box 3: PHC as the Foundation of Recovery

Rebuilding Sudan's PHC is not a logistical task but a strategic investment. A resilient PHC network allows the health system to absorb shocks, manage climate risks, and maintain essential services during active conflict. Post-conflict recovery in Sudan must pivot from restoring physical clinics to creating "Resilience Hubs." These hubs integrate clinical care, environmental health, and epidemic surveillance into a single decentralised platform.

1. Governance & Decentralisation
 - Correcting Centralisation
 - Financial Autonomy: "Block Grants."
2. Digital & Clinical Modernisation
 - Unified Data:
 - Optimised Referrals
3. Environmental & Climate Resilience
 - Frontline Protection:
 - One Health Integration:
4. Epidemic Intelligence
 - Provides IBS coverage, and
 - Provide Early Warning Systems at level of PHC

Governance, Primary Health Care, Climate Resilience, and Multisectoral Foundations for Health Security

In conflict-affected contexts such as Sudan, the health system itself constitutes a critical pillar of national resilience and recovery. Health system recovery is "not a post-crisis afterthought – it is essential for restoring services, rebuilding capacity and ensuring future resilience" (Kruk et al., 2015). World Health Organization guidance further stresses that investing in health during emergencies and recovery phases yields "health systems resilience, thereby supporting health security and universal health coverage" (Kruk et al., 2015; Verhoeven, 2019). Strong health systems therefore underpin broader stability: by restoring essential services and promoting equity, they contribute to rebuilding public trust, strengthening social cohesion, and advancing peace and development objectives (Kruk et al., 2015). In fragile settings, the health sector thus plays a strategic role not only in saving lives, but in anchoring humanitarian–development transitions and accelerating sustainable development trajectories.

Conflict Impacts on Sudan's Health System

The 2023 war in Sudan has inflicted catastrophic damage on health infrastructure, institutions, and governance arrangements. Even before the conflict, Sudan's health system was underfunded, fragmented, and critically understaffed (Kruk et al., 2015). The escalation of violence forced approximately 70% of hospitals and clinics in the worst-affected states to close (Kruk et al., 2015), as facilities were damaged, looted, or rendered inaccessible. In the absence of functioning emergency transport, patients resorted to improvised solutions: ambulances were frequently commandeered or destroyed, and individuals in need of urgent care were transported by donkey carts or other informal means (Kruk et al., 2015). Health workers were among the most directly affected, with many experiencing prolonged non-payment of salaries, exposure to violence, or forced displacement abroad, further exacerbating pre-existing workforce shortages (Kruk et al., 2015). The conflict also deepened the health financing crisis: looting and economic collapse intensified reliance on out-of-pocket payments, already borne by more than 95% of households, and deprived the system of both public and private revenue streams (Kruk et al., 2015).

Concurrently, governance arrangements fractured as federal and state health authorities struggled to operate in synchrony, eroding the decentralised stewardship structures that Sudan had begun to establish prior to the war. Collectively, these impacts, service disruption, workforce attrition, financing breakdown, and governance collapse, have profoundly weakened Sudan's health system as an infrastructure for resilience. Sudan's recovery is predicated on reversing the 'medical exodus.' A 'Digital Health Reserve' should be established, allowing exiled Sudanese clinicians to provide tele-supervision and remote training to frontline community workers, ensuring that intellectual capital is retained even if physical presence is lost. To mitigate the 'medical brain drain,' Sudan must adopt a Hybrid Workforce Model'. This entails a formal platform for the Sudanese medical diaspora to provide 'Tele-Supervision' and 'Digital Mentorship' to mid-level providers (nurses and community health workers) on the frontlines. This ensures that while specialised doctors may be physically absent, their clinical expertise remains integrated into the national recovery.

Box 4: Key Elements of the HDP Nexus in Health

- The Humanitarian–Development–Peace (HDP) Nexus integrates emergency response, long-term recovery, and peacebuilding within a unified health systems framework.

Humanitarian Pillar

- Focuses on immediate life-saving and emergency interventions.
- Includes:
 - trauma and emergency care,
 - emergency nutrition support,
 - infectious disease surveillance and containment,
 - outbreak response,
 - provision of essential medicines and supplies.
- In Sudan, humanitarian action frequently operates through “humanitarian substitution” because of weakened or absent state institutions.
- Prioritises rapid service delivery in conflict, displacement, and disaster settings.

Development Pillar

- Focuses on long-term health system sustainability and institutional recovery.
- Includes:
 - training and retention of a permanent health workforce,
 - strengthening resilient Primary Health Care (PHC) systems,
 - rebuilding and equipping health infrastructure,
 - establishing stable and equitable health financing systems,
 - improving governance, planning, and health information systems.
- Aims to reduce long-term dependence on external humanitarian assistance.
- Emphasises national ownership, institutional capacity, and system resilience.

Peace Pillar

- Focuses on addressing the structural and social drivers of conflict.
- Treats health as an instrument of peacebuilding and social stabilization.
- Promotes:
 - equitable distribution of health services,
 - inclusion of marginalised and conflict-affected populations,
 - reduction of center–periphery inequalities,
 - restoration of trust between communities and institutions.
- Contributes to rebuilding the social contract and reducing grievances associated with exclusion and marginalisation.
- Encourages community participation, local accountability, and socially cohesive recovery processes.

Health System Recovery through the Humanitarian–Development–Peace (HDP) Nexus

Health system recovery in post-conflict Sudan cannot be framed as a linear shift from relief to development, but must follow a Humanitarian–Development–Peace (HDP) Nexus approach, recognising that response, system rebuilding, and peacebuilding are interdependent. In fragile contexts, health systems are not only service platforms but core state institutions that shape trust, absorb shocks, and reduce conflict risk. The HDP Nexus therefore positions health as both a life-saving sector and a stabilising public good (Blanchet et al., 2017; El-Gizouli and Siddig, 2022; Dafallah et al., 2023).

Evidence from fragile settings shows that post-conflict systems remain vulnerable to recurrent shocks due to weak institutions, fragmented financing, and limited fiscal space. Health systems reliant on short-term humanitarian models or parallel delivery cannot sustain recovery. HDP-aligned approaches instead prioritise institution-building, national stewardship, and subnational capacity, with gradual reintegration of humanitarian functions into government systems (Blanchet et al., 2017; El-Gizouli and Siddig, 2022; Dafallah et al., 2023).

Sudan's post-2023 collapse illustrates this clearly: pre-existing centralisation, weak PHC, and fragmented systems led to paralysis when conflict disrupted national coordination. This reinforces that resilience is generated at the periphery. HDP-oriented recovery therefore emphasises decentralisation, PHC strengthening, and local governance as peace-sustaining investments (Kruk et al., 2015; Awad et al., 2021; Dafallah et al., 2023; Elamin et al., 2024).

Humanitarian interventions must act as entry points for system reconstruction rather than substitutes for it. Aligning emergency programmes with national planning, financing, workforce development, and interoperable data systems strengthens long-term capacity. Without this, prolonged reliance on external financing risks entrenching parallel systems and weakening reform incentives (Blanchet et al., 2017; Awad et al., 2021; El-Gizouli and Siddig, 2022; Dafallah et al., 2023). Nevertheless, the HDP Nexus also links health to peacebuilding. Equitable access to services reduces grievance and strengthens social cohesion, while exclusion reinforces instability. When governed inclusively, health systems generate visible peace dividends by demonstrating state responsiveness and legitimacy (El-Gizouli and Siddig, 2022; Dafallah et al., 2023; Elamin et al., 2024).

Accordingly, recovery should be treated as national resilience infrastructure grounded in HDP principles. This requires shifting from service restoration to social contract reconstruction—embedding decentralised governance, community participation, and accountability mechanisms that rebuild trust and position health systems as instruments of stability and long-term recovery (Blanchet et al., 2017; Kruk et al., 2015; El-Gizouli and Siddig, 2022).

Disruption of Surveillance, Epidemic Intelligence, and Health Security

The conflict has severely disrupted Sudan's surveillance and public health intelligence systems, undermining a core pillar of health security. Targeting of telecommunications, health information platforms, laboratories, and transport networks has constrained reporting, delayed diagnosis, and weakened outbreak detection. Combined with displacement, overcrowding, and environmental degradation, these conditions have amplified epidemic risk and cross-border threats (Kruk et al., 2015).

These failures represent a direct erosion of Sudan's capacity to meet International Health Regulations (2005) obligations in surveillance, verification, and response. As global evidence shows, IHR core capacities cannot be sustained without functional surveillance and laboratory systems, making their collapse a threat to both national and regional health security (Newbrander et al., 2014).

Adaptive measures partially preserved functionality. Expansion of event-based surveillance and EWARS, alongside simplified and decentralised reporting through DHIS2 and adapted MDSR systems, prioritised timeliness over completeness and enabled continued detection and risk assessment in some states. This demonstrates that decentralised, hybrid, and digitally supported systems can sustain epidemic intelligence under conflict, but also highlights that resilience depends fundamentally on governance (Kruk et al., 2015).

Despite these adaptations, the system remains severely compromised. Recurrent outbreaks of cholera, dengue, and Rift Valley fever reflect delayed detection, weak laboratory confirmation, and collapsed animal and environmental surveillance. These are not isolated events but predictable outcomes of systemic failure (Blanchet et al., 2017; Kruk et al., 2015; Verhoeven, 2019). The conflict has further amplified One Health risks through collapse of veterinary services, weakened environmental monitoring, and increased informal livestock movement under climate stress. Restoring integrated surveillance—linking human, animal, and environmental systems through joint risk assessment and information-sharing—is therefore essential for preparedness and IHR compliance (Blanchet et al., 2017; Verhoeven, 2019).

Recovery offers an opportunity to embed health security within system reconstruction. Rebuilding surveillance, laboratories, emergency operations centres, and response capacity, while restoring multisectoral coordination, ensures epidemic intelligence functions as a routine system capability rather than an emergency measure. Still, effective recovery, however, requires investment beyond technical systems. Surveillance depends on functioning primary health care, environmental services, and decentralised governance that generate signals and enable action. Without these, epidemic intelligence cannot operate or inform response.

In this context, surveillance collapse is both a symptom and a driver of fragility. Restoring integrated, decentralised, and environmentally informed

epidemic intelligence is therefore essential; not as a technical add-on, but as the core infrastructure linking health recovery, governance, and resilience in post-conflict Sudan (Kruk et al., 2015).

Box 5: PHC as the Foundation of Recovery

Rebuilding Sudan's PHC is not a logistical task but a strategic investment. A resilient PHC network allows the health system to absorb shocks, manage climate risks, and maintain essential services during active conflict. Post-conflict recovery in Sudan must pivot from physical clinic restoration to the creation of 'Resilience Hubs.' These hubs integrate clinical care, environmental health, and epidemic surveillance into a single decentralised platform.

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Primary Health Care as a Foundation for Resilience

A primary health care (PHC)–centred system is the foundation of resilient health systems. WHO evidence shows PHC can deliver up to 90% of essential services and provides the most reliable interface between communities and the state, particularly in fragile settings where higher-level facilities are disrupted (Witter et al., 2017).

In post-conflict Sudan, prioritising PHC is central to Universal Health Coverage and SDG 3. Recovery must go beyond restoring services to restructuring delivery models—strengthening first-contact care, referral systems, community outreach, and supply chains while improving efficiency and equity. Digital health information systems, including interoperable platforms and unified patient identifiers, are critical to improving continuity of care and generating real-time population health intelligence linked to surveillance systems (Blanchet et al., 2017; Witter et al., 2017).

PHC is also central to decentralisation and governance reform. Pre-conflict arrangements were constrained by weak financing, unclear mandates, and centralisation, leading to system paralysis when Khartoum became inaccessible. Strengthening PHC at state and locality levels redistributes capacity, enabling responsive decision-making and embedding accountability within subnational structures (Blanchet et al., 2017; Kruk et al., 2015; Awad et al., 2021; Elamin et al., 2024).

PHC further serves as a frontline platform for environmental health and climate resilience. Facilities and community workers are often first to detect risks related to water, sanitation, waste, flooding, and vector proliferation. Integrating environmental health functions into PHC—through health promotion, WASH, and collaboration with local authorities; supports early risk detection and community adaptation to climate-related threats (Blanchet et al., 2017; Paquet et al., 2006; Buehler et al., 2003). Pre-existing gaps, uneven coverage, workforce shortages, weak supply chains, and poor referral systems, have been exacerbated by conflict, with many facilities non-functional and preventive services disrupted. Recovery must therefore redesign PHC to be more equitable, decentralised, and resilient rather than simply restoring pre-crisis structures (Kruk et al., 2015; Awad et al., 2021; Elamin et al., 2024).

Critically, PHC underpins surveillance and epidemic intelligence. Community workers and primary care facilities are often the first to detect unusual health events. Integrating surveillance into PHC through training, digital tools, and reporting systems strengthens early warning and IHR compliance (Blanchet et al., 2017; Verhoeven, 2019; Awad et al., 2021). Reframing PHC centres as “resilience hubs” further strengthens this role. These hubs combine service delivery with real-time surveillance, environmental monitoring, and flexible financing, enabling rapid adaptation to shocks.

In sum, rebuilding PHC is not simply service restoration but a strategic investment in governance, resilience, environmental health, and epidemic intelligence. A strong PHC network anchors health system recovery, enabling shock absorption, continuity of care, and early detection of emerging risks within a broader national resilience framework (Blanchet et al., 2017; Witter et al., 2017).

Resilient health systems in Sudan must integrate climate and environmental considerations. Climate change acts as a threat multiplier, intensifying floods, droughts, displacement, and climate-sensitive diseases such as cholera, malaria, dengue, and Rift Valley fever. WHO emphasises that systems must anticipate and adapt to such shocks to sustain services and protect health (Blanchet et al., 2017; Witter et al., 2017; Paquet et al., 2006).

Recovery provides an opportunity to embed climate-smart infrastructure. Rehabilitated facilities should incorporate renewable energy, reliable water and sanitation, climate-adapted design, and safe waste management. In Sudan, solar power and flood-resilient facility placement are critical to maintaining service

continuity and emergency response capacity (Witter et al., 2017; Organisation for Economic Co-operation and Development, 2022).

Environmental surveillance is equally essential. Monitoring water quality, sanitation, vector density, and climate variables, and integrating these into routine surveillance, enables early risk detection and anticipatory response, particularly in flood- and displacement-prone settings (Paquet et al., 2006; Buehler et al., 2003). Effective implementation depends on intergovernmental coordination. Municipal authorities manage key environmental determinants, water, sanitation, waste, and vector control, requiring strong alignment with national health systems, clear mandates, and adequate financing to ensure impact (Blanchet et al., 2017; Awad et al., 2021; Buehler et al., 2003). Waste management is a critical priority. Conflict-driven accumulation of solid and medical waste increases risks of vector proliferation and waterborne disease. Restoring safe waste systems within facilities and municipalities is essential for infection prevention and environmental protection (Paquet et al., 2006; Buehler et al., 2003).

Community engagement further strengthens resilience. Local actors are often the first to detect environmental risks and play a central role in early warning, risk communication, and adaptation. Integrating community participation enhances trust, accountability, and sustainability (Blanchet et al., 2017; Awad et al., 2021; Paquet et al., 2006).

Overall, embedding climate resilience and environmental health into recovery is not optional but foundational. Integrating climate-informed planning, environmental surveillance, municipal services, and community engagement transforms health systems into adaptive, multisectoral resilience platforms aligned with One Health and Health in All Policies approaches (Paquet et al., 2006; Buehler et al., 2003).

Box 6: Private Sector Integration & Health Financing

Private sector engagement must be tethered to financing reform. Without shifting from out-of-pocket payments, expanding private care will entrench inequality rather than build resilience. The private sector is a structurally significant pillar of health delivery, not a marginal actor. However, its pre-war growth was fuelled by a regressive financing model where 65–70% of costs were paid out-of-pocket, leading to widespread catastrophic health expenditure.

- Strategic shift from fragmented to regulated: transform the private sector into a strategic partner through performance-based contracting and standardised reimbursement rates.
- Financing reform as an equity lever: strategic purchasing by contracting private providers within public insurance schemes, the state can leverage existing capacity while protecting households from debt.
- Health workforce and sustainability: through income stabilisation as strategic purchasing provides a pathway to stabilise clinician incomes, reducing the brain drain and the need for informal payments.
- Dual-practice frameworks: new regulations are required to balance public service requirements with private practice incentives.
- Stewardship and accountability as regulatory guardrails: Integration requires robust licensing, price regulation, and quality assurance to prevent price inflation and service variation.
- Also Inclusion: faith-based and community-supported facilities must be integrated into national reporting and financing frameworks to ensure accountability.

Private Sector Contribution

In Sudan, the private sector is a major component of the health system, delivering a large share of outpatient care, diagnostics, and specialised services. WHO recognises that engaging private providers can strengthen capacity and resilience if supported by effective regulation and stewardship. In Sudan, this makes the private sector integral to recovery and progress toward Universal Health Coverage (UHC) (Blanchet et al., 2017).

Before the conflict, Sudan's financing system was highly regressive, with out-of-pocket payments accounting for 65–70% of health expenditure, reflecting weak public investment and limited risk pooling. This drove rapid expansion of private facilities and increased reliance on fee-for-service care, but also deepened

inequity and financial hardship, with rising catastrophic health expenditure among households (Awad et al., 2021; Dantur Juri et al., 2015).

Recovery strategies must therefore link private sector engagement with health financing reform. Expanding health insurance and strategic purchasing can integrate private providers into pooled financing systems, improving access while protecting households from financial risk. This is particularly critical for high-cost and specialised services that are largely concentrated in the private sector (Blanchet et al., 2017; Dantur Juri et al., 2015). Strategic purchasing also enables the state to regulate quality and efficiency through standardised contracts, reimbursement mechanisms, and clinical guidelines. In fragile settings, this approach allows governments to leverage existing private capacity while maintaining stewardship over service delivery and equity (Blanchet et al., 2017; Dantur Juri et al., 2015).

The private sector is also central to primary health care (PHC), particularly in urban areas, where many providers remained operational during the conflict. Integrating private PHC into national systems through contracting, referral linkages, and reporting mechanisms can rapidly expand access and support system recovery (Blanchet et al., 2017; Awad et al., 2021).

Health workforce dynamics further reinforce this role. With low public salaries, private practice has become a key income source for health workers. Aligning private sector engagement with financing reforms can stabilise incomes, support retention, and reduce informal payments, while regulatory safeguards ensure equitable distribution of staff (Blanchet et al., 2017; Awad et al., 2021).

Effective governance is essential. Without strong regulation, private sector expansion risks price inflation, quality variation, and exclusion. Strengthening licensing, accreditation, price controls, and enforcement capacity ensures alignment with national priorities, particularly for faith-based and community providers operating in underserved areas (Blanchet et al., 2017; Dantur Juri et al., 2015).

Ultimately, private sector engagement must be embedded within broader financing reform. By expanding risk pooling, strengthening regulation, and aligning incentives with UHC goals, Sudan can harness private capacity to improve access, protect households, and reinforce system resilience rather than fragmentation (Blanchet et al., 2017; Awad et al., 2021; Dantur Juri et al., 2015).

Table 2

<i>Indicator</i>	Pre-War Status (Approx. 2022)	Recovery & UHC Goal
<i>Out-of-Pocket (OOP) Spending</i>	65% – 70% (Highly Regressive)	< 30% (Financial Protection)

<i>Gov. Health Expenditure</i>	5% – 6% of Total Budget	15% (Abuja Declaration Target)
<i>Insurance Coverage</i>	Majority uninsured; fragmented risk pooling	Universal enrolment with subsidised premiums for vulnerable groups
<i>Private Sector Role</i>	Fee-for-service; unregulated growth	Strategic partner via performance-based contracting
<i>Service Access</i>	Urban-concentrated; high cost-barriers	Equitable distribution through regional contracting

Donor Fatigue, Financing Fragmentation, and the Imperative of Sovereign Recovery

A major constraint on Sudan's health system recovery is the sharp decline in public expenditure, now below 6%, increasing reliance on external aid amid growing global donor fatigue. Competing crises, climate shocks, and fiscal tightening have reduced both the volume and predictability of aid, particularly in fragile settings. Fragmented financing, parallel systems, and weak stewardship further accelerate disengagement by increasing transaction costs and reducing confidence. Evidence shows donors sustain support where recovery is anchored in coherent national strategies, credible governance, and transparent accountability (Blanchet et al., 2017; El-Gizouli and Siddig, 2022; Dafallah et al., 2023; Ryan et al., 2020).

Addressing donor fatigue is therefore a matter of institutional design rather than advocacy. A sovereign, costed recovery framework aligned with national systems and International Health Regulations (2005) obligations signals credibility and enables a shift from fragmented projects to pooled, multi-year financing for core functions such as PHC, surveillance, workforce, and environmental health. Without this, continued reliance on humanitarian substitution risks reinforcing volatility and fragility (Blanchet et al., 2017; El-Gizouli and Siddig, 2022). Within this constrained context, transitional financing mechanisms are needed. Community-based Health Cooperatives can serve as interim risk-pooling arrangements, supported by donor seed funding and structured at the

district level. By pooling household contributions and contracting public and private providers, they can stabilise access, reduce catastrophic expenditure, and generate institutional learning for future national insurance systems (Ryan et al., 2020; Dantur Juri et al., 2015). Their value lies in bridging toward sovereign financing. Linked to PHC and governed through transparent local mechanisms, these cooperatives support benefit design, provider payment, and trust-building, while offering donors a pathway to invest in system transformation rather than recurrent humanitarian support (Blanchet et al., 2017; Ryan et al., 2020).

Ultimately, confronting donor fatigue requires reshaping the financing architecture. By combining coherent national planning, disciplined donor alignment, and transitional risk-pooling mechanisms, Sudan can shift from dependence to a sovereign, equitable, and resilient health system capable of sustaining long-term recovery.

Community Engagement and Decentralised Governance

Community engagement and decentralised governance are foundational to health system resilience in fragile settings. In Sudan, where conflict and displacement have weakened centralised control, recovery depends on whether local institutions and communities can co-produce services. Approaches that bypass communities or ignore local power dynamics risk reinforcing inequities and undermining trust and legitimacy (Blanchet et al., 2017; El-Gizouli and Siddig, 2022).

Operationalising this requires institutionalised participation across the recovery cycle—needs assessment, service design, grievance redress, and performance monitoring. Community structures can identify barriers, support service uptake, and sustain outreach, particularly for PHC, immunisation, maternal health, and outbreak prevention where trust and communication are critical (Blanchet et al., 2017; Kruk et al., 2015; Gilson, 2003).

Decentralised governance is the institutional counterpart. Strengthening state and district systems, clarifying mandates, restoring financing flows, and embedding accountability mechanisms enables responsive, locally adapted service delivery. Aligning partners and providers within unified district plans prevents fragmentation and reinforces system coherence (Blanchet et al., 2017; Truppa et al., 2024; El-Gizouli and Siddig, 2022).

Evidence from Liberia, Sierra Leone, and Afghanistan shows that institutionalised community engagement and decentralised delivery sustain services and strengthen recovery in fragile contexts (World Health Organization, 2023; Paquet et al., 2006; Newbrander et al., 2014; Salehi et al., 2018). The key lesson is that community participation is most effective when embedded within governance systems linking local action to national stewardship (Blanchet et al., 2017; El-Gizouli and Siddig, 2022; Kelsall and Booth, 2010).

This community–decentralisation nexus also underpins health security. Local actors are often first to detect outbreaks and environmental risks. When

linked to formal reporting and response systems, these signals enable timely containment. Embedding participation and decentralisation is therefore a prerequisite for effective surveillance and IHR-aligned epidemic intelligence (Blanchet et al., 2017; Gilson, 2003).

Health in All Policies and Multisectoral Action

A Health in All Policies (HiAP) approach is essential for Sudan's recovery, as key drivers of ill health lie beyond the health sector. WHO guidance emphasises integrating health across sectors, particularly in fragile settings where fragmentation worsens outcomes. In Sudan, weak WASH access and conflict-related disruption have directly contributed to recurrent cholera outbreaks, demonstrating that health system recovery alone is insufficient without coordinated multisectoral action (Blanchet et al., 2017; Kruk et al., 2015; Awad et al., 2021; Paquet et al., 2006).

Housing and urban conditions further illustrate these links. With over eight million displaced, overcrowding, poor sanitation, and inadequate waste management have increased risks of respiratory, vector-borne, and infectious diseases. Health-informed urban planning—integrating WASH, safe site selection, and waste systems—is therefore a critical component of recovery (Blanchet et al., 2017; Awad et al., 2021; Paquet et al., 2006).

Education disruption has also amplified health risks. With over 60% of children out of school, loss of health literacy and school-based services (nutrition, immunisation, psychosocial support) has long-term consequences. Integrating health into education recovery, through school health programmes and WASH improvements, supports both SDG 3 and SDG 4 (Awad et al., 2021; Paquet et al., 2006).

Operationalising HiAP requires stronger intersectoral governance and data integration. Linking health data with WASH, housing, climate, and education indicators enables more coherent policy responses and prioritisation in fragmented settings (Blanchet et al., 2017; Awad et al., 2021). Moreover, decentralisation reinforces this approach. Since many health determinants are managed at state and municipal levels, embedding health into local planning, budgeting, and service delivery strengthens accountability and responsiveness, particularly in displacement-affected areas (Blanchet et al., 2017; Awad et al., 2021).

Overall, HiAP is not just a coordination tool but a governance reform mechanism. By integrating health into multisectoral policies, Sudan can address structural determinants, reduce vulnerability to shocks, and strengthen resilience, social protection, and sustainable recovery (Paquet et al., 2006).

Box 7: Health in All Policies (HiAP)

is a collaborative approach that integrates health considerations into policymaking across all sectors, such as transportation, agriculture, and education. It recognises that health is influenced by social, environmental, and economic factors, and aims to improve population health and equity by ensuring that all government decisions avoid harmful health impacts and promote well-being.

HiAP and Multisectoral Action in Sudan

For Sudan to recover from conflict and adopt a whole-of-government approach where the primary drivers of illness and death now lie outside the health sector, it depends on the

1. Critical Sectoral Interventions
 - WASH (Water, Sanitation, and Hygiene)
 - Housing and Urban Planning
 - Education
2. Governance and Implementation
 - Evidence-Informed Coordination
 - Decentralisation
 - Governance Reform

Reasserting State Stewardship in Health System Recovery

Sudan's recovery must draw on global experience while reasserting the state as the primary steward and financier of reconstruction. Evidence shows that sustainable recovery depends not only on external assistance but on governments progressively financing core functions as an expression of sovereignty and accountability. WHO guidance emphasises aligning recovery with national priorities and embedding resilience under government leadership rather than parallel structures (Blanchet et al., 2017).

Experience from contexts such as Sierra Leone, Afghanistan, and Iraq demonstrates that recovery is most durable when external support transitions toward domestic resource mobilisation and state-led financing. Where reliance on fragmented aid persists without strengthening public financial management, gains remain fragile. Conversely, protecting and expanding domestic spending on core functions—such as PHC, workforce, and surveillance—supports continuity, legitimacy, and resilience, particularly when complemented by coordinated external support (Ryan et al., 2020).

For Sudan, this requires aligning humanitarian, recovery, and development financing behind government-led strategies and medium-term frameworks.

External assistance should support system-wide functions and strengthen planning, procurement, and accountability systems, rather than perpetuating parallel delivery mechanisms. Thus, recovery must also engage multiple sectors—WASH, education, nutrition, and finance—while maintaining clear government leadership over priorities and resource allocation. In this model, international partners act as enablers, reinforcing sovereign decision-making and nationally owned reform trajectories.

Ultimately, the crisis presents an opportunity to correct structural inefficiencies and rebuild the health system on a more equitable and resilient foundation. By combining domestic financing, coherent planning, and disciplined external support, Sudan can transition from dependence to sovereign system transformation, embedding epidemic intelligence, IHR-aligned surveillance, and governance reforms within a durable framework for resilience and peace (Blanchet et al., 2017; Kruk et al., 2015).

Conclusion

Sudan's health system collapse is not episodic but the product of prolonged institutional erosion driven by conflict, fiscal contraction, political instability, and environmental stress. The April 2023 war accelerated, rather than caused, this fragility. Recovery must therefore move beyond service restoration toward institutional reconstruction, repositioning health as core national resilience infrastructure essential to security, legitimacy, and peace.

Three strategic shifts are central. First, recovery must transition from emergency substitution to sovereign stewardship, restoring state authority over priority-setting, regulation, and financing through coherent, costed frameworks aligned with public financial systems and the International Health Regulations (2005). Second, resilience must be generated at the periphery through decentralised governance, strengthened primary health care, empowered municipalities, and community participation to ensure continuity, early detection, and rapid response. Third, epidemic intelligence must be rebuilt as an integrated state function, with surveillance, laboratories, early warning, and response operating within a unified, IHR-aligned architecture incorporating One Health, climate-informed systems, and environmental monitoring.

Operationally, recovery requires pragmatic pathways. Transitional financing mechanisms, including community-based risk pooling, can protect households while rebuilding national systems. Strategic purchasing from regulated private providers can expand access, while nationally governed digital platforms should integrate surveillance, service delivery, and financing data linked to decentralised decision-making.

Ultimately, rebuilding the health system is inseparable from rebuilding trust. Equitable, reliable services strengthen legitimacy and social cohesion, while failure deepens instability. By positioning health as a central pillar of resilience

rather than a residual sector, Sudan can convert systemic collapse into structural reform. With coherent governance, genuine decentralisation, and institutional discipline, recovery can shift from humanitarian dependence to a resilient, IHR-compliant system capable of managing risk and supporting durable peace.

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CHAPTER 8

REBUILDING EPIDEMIC INTELLIGENCE FOR HEALTH SYSTEM RESILIENCE AND SECURITY

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Rebuilding epidemic intelligence in Sudan requires an integrated surveillance architecture combining indicator-based surveillance (IBS) and event-based surveillance (EBS) within a unified, IHR-aligned framework. IBS, the traditional backbone, relies on routine reporting from facilities and sentinel sites to support trend analysis and outbreak detection, but depends on stable services, laboratory confirmation, and consistent reporting - conditions disrupted by conflict.

EBS complements these limitations by capturing unstructured signals, community alerts, rumours, and unusual events, enabling earlier detection of emerging threats. Under the International Health Regulations (2005), risk assessment is central, particularly for zoonotic and environmental hazards (World Health Organization, 2016). In Sudan, EBS was established pre-conflict within the HEEC Directorate to complement IBS. The 2023 conflict exposed their asymmetrical fragility. IBS deteriorated sharply as facilities and systems collapsed, with fewer than 40% of sentinel sites functional by 2025, confirming that routine surveillance alone cannot sustain epidemic intelligence in protracted crises.

Digital transformation offers a recovery pathway. Evidence from Sierra Leone shows that electronic IDSR systems such as DHIS2 improve timeliness, completeness, and data use. Sudan can adopt similar mobile and web-based platforms embedded in PHC and district systems to restore surveillance flows.

EBS remains indispensable in fragile settings. Its adaptive, community-based design, as seen in fragile and conflict-affected settings (including Afghanistan), enables detection when formal systems fail. Sudan's volunteer networks, such as Nafeer groups, provide a foundation for institutionalised EBS, strengthening early detection, trust, and linkage to verification and response while supporting IHR priorities for zoonotic and environmental risks (Newbrander et al., 2014; Salehi et al., 2018; Food and Agriculture Organization of the United Nations, World Organisation for Animal Health and World Health Organization, 2019; World Health Organization, 2016).

Box 1. Indicator-Based and Event-Based Surveillance

- Indicator-based surveillance (IBS) and event-based surveillance (EBS) are complementary pillars of epidemic intelligence under the International Health Regulations (2005). IBS relies on routine reporting of predefined diseases from health facilities and laboratories, supporting trend analysis, burden estimation, and threshold-based outbreak detection, and performs best where services and reporting systems are stable.
- EBS addresses these limitations by capturing unstructured signals—community alerts, rumours, media reports, unusual illness clusters, deaths, animal die-offs, and environmental hazards. By prioritising timeliness over completeness, it enables earlier detection of emerging threats, particularly in fragile or conflict-affected settings.
- Effective epidemic intelligence depends on integrating IBS and EBS within a unified, governed system. IBS provides analytical depth, while EBS enhances sensitivity and responsiveness. When linked through interoperable platforms, clear verification pathways, and decentralised decision-making, this integration enables timely risk assessment and transforms surveillance into an adaptive instrument of health security and public trust.

One Health, Environmental, and Vector Surveillance Integration

Integrating indicator- and event-based surveillance must extend to veterinary, environmental, and vector systems to operationalise a One Health approach aligned with Sudan's risk profile. Zoonotic and climate-sensitive diseases are amplified by displacement, flooding, and environmental degradation, making animal and environmental surveillance integral to IHR (2005) capacities (World Health Organization, 2016).

Veterinary surveillance should be linked to epidemic intelligence through interoperable reporting, joint verification, and shared laboratory systems. Quadripartite guidance emphasises that early detection depends on coordinated surveillance across human, animal, and environmental sectors, making restoration of joint platforms critical in Sudan (Food and Agriculture Organization of the United Nations, World Organisation for Animal Health and World Health Organization, 2019; World Health Organization, 2022a).

Vector surveillance remains a key gap and must be climate informed. Integrating entomological data with climate variables—temperature, rainfall, and flooding—enables anticipatory risk assessment for diseases such as dengue and malaria, supported by geospatial tools and integrated early warning systems. Water quality monitoring similarly provides upstream alerts for cholera and other

diarrhoeal diseases (Mordecai et al., 2019; Ryan, Lippi and Zermoglio, 2020; Dantur Juri et al., 2015; Valdez-Delgado et al., 2023; Intergovernmental Panel on Climate Change, 2022).

Effective implementation requires joint response teams coordinated through emergency operations centres and embedded within decentralised governance, ensuring multisectoral signals translate into timely action and accountability (Food and Agriculture Organization of the United Nations, World Organisation for Animal Health and World Health Organization, 2019; World Health Organization, 2022a; World Health Organization, 2019a).

At the system level, strengthening epidemic intelligence requires institutionalised One Health coordination, including clear mandates, integrated laboratories, and joint risk assessment. It must also extend to regional frameworks, where cross-border surveillance and information sharing—under mechanisms such as the Khartoum Declaration—are essential to managing transboundary risks (Food and Agriculture Organization of the United Nations, World Organisation for Animal Health and World Health Organization, 2019; World Health Organization, 2022a; World Health Organization, 2016).

Restoring municipal functions is equally critical. Environmental services—vector control, water safety, waste management, and market inspection—generate early risk signals and must be integrated into surveillance systems. Linking local data to district and national levels enables anticipatory response and aligns epidemic intelligence with decentralisation and Health in All Policies (HiAP) principles (Mordecai et al., 2019; Ryan, Lippi and Zermoglio, 2020; Richards et al., 2015; World Health Organization, 2015).

Together, integrating One Health, cross-border coordination, and municipal surveillance transforms epidemic intelligence into a multisectoral system of risk governance, strengthening detection, response, and state legitimacy in fragile contexts.

Early Warning Systems as Adaptive Infrastructure

Early warning systems are built on the integration of indicator-based surveillance, event-based surveillance, and One Health information streams, translating diverse inputs into actionable alerts through defined thresholds and risk assessment. Under the International Health Regulations (2005), they operationalise detection, verification, and notification by converting routine data, community signals, laboratory results, and environmental indicators into timely decision triggers (World Health Organization, 2019a; World Health Organization, 2016; World Health Organization, 2022b).

In Sudan, early warning historically relied on routine indicator-based reporting within stable systems, but this model proved inadequate during the conflict as delays, incomplete data, and system collapse reduced sensitivity and timeliness. Crisis-adapted tools, particularly EWARS, restored minimum

detection capacity by prioritising timeliness and linkage to response over completeness, enabling continued IHR functions in disrupted settings (World Health Organization, 2022b; World Health Organization, 2016). However, EWARS is not sustainable as a parallel system. Its long-term value depends on integration into nationally governed platforms such as DHIS2 and routine health information systems, through phased transition that restores data sovereignty, institutional ownership, and system coherence.

Effectiveness depends on decentralised governance. Linking alerts to district and state authorities, emergency operations centres, and rapid response teams ensures timely containment. Integrating environmental and climate data further strengthens anticipatory action for climate-sensitive diseases such as cholera, malaria, and dengue (Mordecai et al., 2019; Ryan, Lippi and Zermoglio, 2020; World Health Organization, 2015). When embedded within national systems, aligned with One Health coordination, and governed through decentralised authority, early warning systems become a durable component of epidemic intelligence, bridging emergency response and long-term resilience.

Laboratory and Specimen Transport Networks

Laboratory systems are a foundational pillar of epidemic intelligence, providing diagnostic confirmation and data essential for risk assessment and response under the International Health Regulations (2005). In Sudan, the collapse of access to the National Public Health Laboratory following COVID-19 and the 2023 conflict created a major diagnostic gap, weakening surveillance accuracy and timeliness. Evidence from fragile settings shows that without laboratory confirmation, systems rely on syndromic signals, increasing both under- and over-reaction to health threats (Kruk et al., 2015; Elamin et al., 2024; World Health Organization, 2020a).

Emergency decentralisation, including upgrading the Port Sudan laboratory as a temporary national hub, partially restored diagnostic capacity. Similar approaches in post-Ebola and fragile settings have improved outbreak confirmation when supported by clear governance and quality assurance (Kruk et al., 2015; Blanchet et al., 2017; World Health Organization, 2020a). However, these arrangements remain fragile without integration into a coherent national laboratory policy and financing framework.

Sustainable recovery requires rebuilding a tiered laboratory network, from peripheral diagnostics to regional referral capacity and a national reference function for quality assurance, genomic surveillance, and antimicrobial resistance monitoring (World Health Organization, 2016; World Health Organization, 2020a). This must be supported by reliable specimen transport systems linking community detection to laboratory confirmation, as disruptions in transport and cold chain have repeatedly delayed outbreak response in Sudan (Kruk et al., 2015; Blanchet et al., 2017).

Laboratory recovery must also be One Health-oriented, integrating human, veterinary, and environmental systems through shared referral pathways, harmonised standards, and joint data systems to support early detection of zoonotic and environmental threats (Food and Agriculture Organization of the United Nations, World Organisation for Animal Health and World Health Organization, 2019; World Health Organization, 2022a; World Health Organization, 2019a; World Health Organization, 2020a).

From a governance perspective, laboratory and transport systems must be treated as core state functions. Embedding financing, workforce development, and quality assurance within national recovery frameworks restores the credibility of surveillance, strengthens decision-making, and anchors epidemic intelligence as a central component of health system resilience (Kruk et al., 2015; Blanchet et al., 2017; Truppa et al., 2024; World Health Organization, 2020a).

Box 2. Early Warning, Alert and Response System (EWARS)

The Early Warning Alert and Response System (EWARS) is a surveillance platform developed by the World Health Organization for use in humanitarian emergencies and fragile settings. It is primarily a form of event-based surveillance, designed to rapidly capture signals of potential outbreaks when routine health information systems are disrupted. EWARS focuses mainly on syndromic reporting - such as acute watery diarrhoea, febrile illness, or acute respiratory symptoms - rather than confirmed diagnoses, enabling early detection in contexts with limited laboratory capacity.

EWARS has been progressively expanded to incorporate selected indicator-based surveillance features, including structured reporting of priority diseases and basic case counts. This evolution allows EWARS to function both as an emergency detection tool and as a transitional bridge toward re-establishing routine surveillance, while maintaining alignment with the International Health Regulations (2005).

Emergency Operations Centres and Rapid Response Capacity

Emergency operations centres (EOCs) are the backbone of coordinated outbreak response, linking surveillance, laboratory confirmation, logistics, and decision-making into operational action. Evidence from Ebola-affected and fragile settings shows they are most effective when decentralised, empowered, and embedded within national command structures that balance strategic oversight with operational autonomy (Kruk et al., 2015; Blanchet et al., 2017; Truppa et al., 2024; Elamin et al., 2024). In Sudan, strengthening EOCs must therefore combine

national coordination with subnational execution to ensure a timely response at the point of outbreak (Blanchet et al., 2017; Kruk et al., 2015).

Reform should clarify roles across levels. The federal EOC should focus on national risk assessment, strategic coordination, IHR reporting, and technical oversight, while state-level EOCs act as operational hubs with authority to deploy resources, coordinate logistics, and lead response in real time (Blanchet et al., 2017; El-Gizouli and Siddig, 2022). This division enables rapid, context-specific action while maintaining national coherence (Blanchet et al., 2017; Truppa et al., 2024).

Yet, decentralised response capacity is a functional requirement in fragile settings. State and locality EOCs need trained staff, access to surveillance and laboratory data, contingency financing, and logistical resources for immediate mobilisation, supported by pre-positioned funds and flexible procurement systems (Blanchet et al., 2017; Truppa et al., 2024; Awad, Satti and Elmusharaf, 2021).

Nevertheless, Rapid Response Teams (RRTs) translate alerts into field action. Multidisciplinary teams across all levels should integrate clinical, epidemiological, laboratory, veterinary, and environmental expertise to reflect a One Health approach (Kruk et al., 2015; Food and Agriculture Organization of the United Nations, World Organisation for Animal Health and World Health Organization, 2019; World Health Organization, 2022a). Community-based responders (cRRT) further extend reach, particularly in insecure or remote areas, enabling early detection, risk communication, and localised control measures (Blanchet et al., 2017; El-Gizouli and Siddig, 2022).

Together, strengthened EOCs and RRTs operationalise epidemic intelligence as a decentralised, responsive system. By empowering subnational response and repositioning the federal level for strategic oversight, Sudan can institutionalise outbreak response as an IHR-aligned state function that ensures timely action, resource mobilisation, and strengthened public trust (Blanchet et al., 2017; Kruk et al., 2015; Truppa et al., 2024; Elamin et al., 2024).

Box 3. Emergency Operations Centre (EOC)

- An Emergency Operations Centre (EOC) is a coordination hub for managing public health emergencies, integrating surveillance data, risk assessment, logistics, communication, and decision-making under a unified structure. In line with the International Health Regulations (2005), it enables timely analysis, multisectoral coordination, and rapid resource mobilisation.
- An Incident Management Team (IMT) is the operational leadership group activated within or alongside the EOC during an emergency. It directs and oversees response activities—planning, field operations, partner coordination, and technical guidance—using standardised incident management principles to ensure clear roles, accountability, and efficient decision-making.

Integration and Path Forward

The core components of epidemic intelligence in Sudan—surveillance, early warning, laboratories, emergency operations centres, and rapid response—are mutually reinforcing and must function as an integrated system. Digital platforms such as DHIS2 and EWARS can unify data across human, animal, and environmental health, but their effectiveness depends on governance that links information to authority, resources, and accountability. Embedding these systems within primary health care, decentralised governance, environmental services, and sustainable financing transforms surveillance into a core state function (Blanchet et al., 2017; Kruk et al., 2015; Food and Agriculture Organization of the United Nations, World Organisation for Animal Health and World Health Organization, 2019).

COVID-19 exposed the fragility of this system. In Sudan and across the EMR, fragmented governance and weak subnational capacity led to delayed detection, disrupted services, and reduced trust, showing that epidemic intelligence cannot function without stable service platforms, resourced laboratories, and protected health workers (Elhadi et al., 2021). Continuity of primary health care proved essential, as service disruptions were associated with weaker reporting and delayed outbreak recognition (Elhadi et al., 2021; World Health Organization, 2022c). This underscores the need for surveillance systems that remain operational under service disruption through redundancy in data sources and decentralised decision-making (Blanchet et al., 2017; Truppa et al., 2024; World Health Organization, 2022b).

Integration and Path Forward

Effective integration requires clear federal leadership through legally mandated coordination mechanisms aligned with state authorities, municipalities, and partners. Surveillance and response functions must be embedded within governance and planning structures to ensure that data translate into action (Blanchet et al., 2017; Kruk et al., 2015). COVID-19 further demonstrated that unclear mandates delay response, reinforcing the need to separate federal strategic roles from decentralised operational authority (Blanchet et al., 2017; Truppa et al., 2024; Elhadi et al., 2021).

At the subnational level, states and localities must be empowered with financing, decision-making authority, and control over response assets to act on surveillance data while remaining accountable to national standards (Kruk et al., 2015; Blanchet et al., 2017; Truppa et al., 2024). Integration must also extend beyond the health sector through institutionalised One Health coordination, linking human, animal, and environmental systems and incorporating signals from vector surveillance, water quality, waste management, and market systems into epidemic intelligence (Food and Agriculture Organization of the United Nations, World Organisation for Animal Health and World Health Organization, 2019; World Health Organization, 2022a; Elhadi et al., 2021; World Health Organization, 2015).

Cross-border coordination is equally critical. Given population movement and porous borders, regional information sharing and harmonised surveillance are essential for managing transboundary risks and sustaining IHR compliance (World Health Organization, 2016; Food and Agriculture Organization of the United Nations, World Organisation for Animal Health and World Health Organization, 2019).

Sustainable financing and disciplined donor coordination are essential to effective integration. While international partners remain critical, long-term resilience requires gradual absorption of externally supported platforms such as EWARS into national systems, budgets, and governance. This restores data sovereignty, reduces reliance on parallel systems, and aligns epidemic intelligence with national priorities (Blanchet et al., 2017; Gilson, 2003). COVID-19 experience in Sudan and the EMR showed that limited domestic resource mobilisation led to prolonged transmission, disrupted services, and weakened surveillance and trust (Elhadi et al., 2021; World Health Organization, 2022c).

These reforms reposition epidemic intelligence as the connective system linking service delivery, environmental governance, decentralised authority, and national stewardship in line with IHR (2005) core capacities. Embedding surveillance, early warning, risk assessment, and response within coherent governance and financing frameworks enables a shift from fragile, emergency-driven arrangements to a durable state capability. In this model, surveillance becomes a legally mandated function linking information to action at all levels,

strengthening anticipatory risk management, accountability, and compliance while rebuilding trust and supporting long-term recovery (Blanchet et al., 2017; Kruk et al., 2015; Food and Agriculture Organization of the United Nations, World Organisation for Animal Health and World Health Organization, 2019).

Box 4: Key Structural Requirements

Pillar	Requirements	Purpose
Institutional	Legally mandated coordination	To avoid ambiguous or contested mandates during crisis.
Financial	Sustainable Domestic Financing	To end, depending on volatiles vertical programs and donor manipulations through preserving sovereignty over health sector
Technical	Digital Backbone (i.e. Digitalisation)	To unify the data stream of different sectors and strengthening informed decision making
Geopolitical	Regional Frameworks	To manage transboundary threats and informal population movements.

Conclusion

Sudan's health system collapse reflects cumulative institutional erosion driven by conflict, fiscal contraction, political rupture, and environmental stress. The 2023 war accelerated, rather than caused, this fragility, exposing a system weakened by over-centralisation and fragmentation. Recovery must therefore shift from service restoration to institutional reconstruction, positioning health as core national resilience infrastructure.

Three strategic priorities follow. First, transition from humanitarian substitution to sovereign stewardship, with the state reasserting control over policy, financing, and regulation through coherent, IHR-aligned frameworks. Second, generate resilience at the periphery through decentralised governance, strengthened primary health care, empowered municipalities, and integrated environmental services. Third, institutionalise epidemic intelligence as a unified state capability linking surveillance, laboratories, early warning, and response within a One Health, climate-informed system.

Operationally, recovery requires pragmatic pathways combining transitional financing, strategic purchasing, and nationally governed digital systems to restore access while strengthening coherence. Ultimately, rebuilding the health system is inseparable from rebuilding trust: reliable, equitable services reinforce legitimacy, while failure deepens instability.

With institutional discipline and decentralised authority, these reforms enable a transition from humanitarian dependence to a resilient, IHR-compliant system capable of managing risk and sustaining peace. Central to this transition is Health Sovereignty: the capacity of national institutions to govern, finance, and generate their own health intelligence. In this framing, health is not only an outcome of recovery but a primary instrument of it.

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CHAPTER 9

BRIDGING THE CHASM: A STRATEGIC ROADMAP FOR PREVENTIVE MEDICINE AND HEALTH SYSTEM RECOVERY IN POST-CONFLICT SUDAN

Hafi Saad, Eltayeb Elamin, and Mohamed Elduma

Since April 2023, Sudan has faced an unprecedented humanitarian and protection crisis driven by protracted armed conflict. Approximately 11.5 million people are internally displaced, constituting the largest internal displacement crisis globally, and with 30 million people requiring humanitarian assistance in 2025 (International Organization for Migration, 2025; Elamin et al., 2024). Acute food insecurity, recurrent disease outbreaks, and climate shocks have converged, particularly in Khartoum, Darfur, and Kordofan (Balkhy, 2024; Homeida, 2023). Concurrently, Sudan's health system has been systematically degraded by attacks on healthcare facilities, workforce attrition, supply chain collapse, and chronic underfinancing (Elamin et al., 2024). As of early 2026, approximately 37% of health facilities remain non-functional (Elamin et al., 2024; Ahmed et al., 2024).

Investment in preventive medicine, particularly in community medicine and public health, can significantly reduce the burden on curative services in a low-income country when implemented as part of a sustained, strong, targeted prevention programme. Evidence from predictive modelling and large-scale community trials shows that consistent preventive care can reduce neonatal mortality by up to 33% and maternal mortality by nearly 49%, directly decreasing the incidence of emergency obstetric hospitalisations (Robinson et al., 2025; Javaid et al., 2025). Moreover, systematic reviews of community health worker programs focused on infectious diseases like malaria and TB demonstrate that these interventions are highly cost-effective compared to facility-based care, and investment in community-based prevention yields substantial savings in acute care costs (PLOS Global Public Health, 2026). Health economic analyses suggest that scaling up these targeted measures can reduce curative medicine expenditure by an estimated 20–25% over a 3–5-year period in low-income settings, as healthier populations require fewer costly inpatient treatments and emergency interventions (PLOS Global Public Health, 2026; Kruk et al., 2018).

This paper outlines a transformative, specific-points recovery framework designed to guide Sudan's transition from fragmented humanitarian aid to a resilient, state-led health system. It calls for the establishment of a central coordination hub for all donors and funders, ensuring alignment, transparency, and maximised impact for Sudanese beneficiaries. The framework advocates for the

strict adoption of an Integrated Health Area System (IHAS) to unify preventive and community medicine at the district level, supported by a National Health Security and Fiscal Commitment Act to safeguard funding against political volatility. It further emphasises the critical role of Community Medicine and Public Health departments across all states, urging their active engagement in health planning, service delivery, and monitoring, with dedicated funding allocated to strengthen their capacity. The roadmap prioritises equitable resettlement of the health workforce, preservation of regional centres of excellence, and integration of digital health innovations. By addressing the social determinants of health (including education, sanitation, and digital literacy) and strengthening governance through transparency and community engagement, this framework positions health as a primary vehicle for national decentralisation, state legitimacy, and sustainable peacebuilding.

From Humanitarian Crisis to Systemic Collapse

Sudan is currently experiencing one of the most severe humanitarian crises worldwide. The ongoing conflict has devastated health infrastructure, disrupted essential services, displaced health workers, and widened long-standing regional inequities (Elamin *et al.*, 2024). Even before the war, Sudan's health indicators lagged substantially behind global averages; the conflict has accelerated this decline through mass displacement, disruption of social services, and diversion of public resources toward war expenditure. The resulting “welfare gap” now represents a structural breakdown rather than a temporary developmental delay (Elamin *et al.*, 2024; Koka, 2023). Without deliberate post-conflict reform, continued reliance on the same health system policies and fragmented humanitarian delivery risks entrenching inefficiency, inequity, and dependency rather than enabling recovery (Koka, 2023).

The Comparative Indicator Gap

Comprehensive national surveys to estimate health indicators and progress have been severely constrained by insecurity. Nevertheless, available pre-war indicators, which are already among the weakest globally, are expected to have deteriorated further due to displacement, service disruption, and workforce flight.

Comparative Data Table:

Indicator	Sudan (Current Data)	World Average	International Standard (HIC Average)
GDP per Capita (PPP)	\$2,115.8	~\$24,404.8	66,462.6
Life Expectancy	66 years	73 years	80 years
Maternal Mortality	256 per 100,000 live births	197 per 100,000 live births	~10 per 100,000 live births
Neonatal Mortality (First 28 days of life)	~25 per 1,000 live births	17 per 1,000 live births	3 per 1,000 live
Vaccine Coverage children age 12-23 months	39% (DTP coverage)	~85% (DTP coverage)	94% (DTP coverage)
People using at least basic water services	65%	91%	>99%
Health expenditure (% of GDP)	6.5%	9.84%	12.49%

Source: World Bank indicator data (compiled by the author) (World Bank, 2022–2025).

Similarly, the gap is wider with the Sustainable Development Goals (SDG) targets for Universal Health Coverage (UHC) where the country is scoring 44.5 out of 100 (compared to a global average of 65), reflecting low service coverage before the war having further deteriorated due to the conflict (Elamin et al., 2024; World Health Organization, 2024). The widening gap between Sudan and global health benchmarks underscores the urgency of transitioning from emergency response in the post-conflict era toward system reconstruction grounded in equity, efficiency, sustainability, and accountability (Bashier, Hakim and Ahmad, 2025; Elnaiem, Mohamed-Ahmed and Abdalla, 2023).

Administrative Fragmentation and the Case for Integration

Public health and community medicine in Sudan have historically operated within fragmented administrative silos. Federal oversight remains functional in parts of eastern, central, and northern Sudan, while large areas of Darfur and Kordofan are largely inaccessible to state institutions and depend almost entirely on humanitarian actors. This fragmentation has resulted in parallel service delivery,

limited accessibility, poor service coverage, weak surveillance, and inefficient resource allocation (Elamin et al., 2024; World Health Organization, 2026).

In a vast country like Sudan where resources are limited, post-conflict recovery requires strict adoption of an IHAS, whereby public health (population-level prevention and surveillance) and community medicine (primary and local clinical care) are unified under a single district-level authority responsible for a defined population. Federal and state levels retain stewardship roles (policy formulation, standard setting, quality control, and resource mobilisation) while operational responsibility is decentralised to the local level (Elnaiem, Mohamed-Ahmed and Abdalla, 2023). Integration enables real-time linkage between service delivery and public health action, for example, when increased malaria case detection at primary care level triggers district-wide vector control and surge of additional resources from state and local level to respond to epidemics. This decentralised approach strengthens responsiveness, accountability, and efficiency and most importantly defines roles and responsibilities of the different health governance structures (Bashier, Hakim and Ahmad, 2025; Elnaiem, Mohamed-Ahmed and Abdalla, 2023).

IHAS Conceptual Framework and International Evidence

The IHAS (or district health system) is a population-based model integrating community health services, primary health care facilities, and a referral hospital within a defined catchment area, supported by unified planning, budgeting, supervision, and health information systems (HIS) (World Health Organization, 2007).

The model is particularly suited to fragile and post-conflict settings where resources are constrained and needs are high. Many developing countries with similar context to Sudan have adopted and implemented a decentralised health system as the cornerstone of their post-conflict recovery with tangible results. Rwanda's post-genocide reconstruction demonstrates the effectiveness of district-based integrated systems, achieving reductions exceeding 70% in under-five mortality and 75% in maternal mortality (Binagwaho et al., 2014). Liberia and Sierra Leone restored essential services through integrated district models, although sustainability depended on domestic financing (Kruk et al., 2010). Afghanistan showed that integration remains feasible even amid insecurity when NGOs operate within national district frameworks (Newbrander et al., 2014). These experiences closely mirror Sudan's current conditions.

While health services delivery in Sudan has seen some decentralising efforts and delegation of authority from federal to state level, there is no comprehensive system at local/district level. States and districts rely heavily on federal support including supplies, human resources and response to epidemics. The absence of such a system in Sudan has produced parallel NGO-led delivery especially in areas affected by conflict, urban concentration of services, weak referral pathways, and

profound rural-urban inequities (Elamin et al., 2024; Kruk et al., 2018). Strict post-conflict adoption and implementation of IHAS would enable rational allocation and equitable distribution of scarce resources and a transition from humanitarian substitution toward sustainable national ownership (Kruk et al., 2018; Bashier, Hakim and Ahmad, 2025).

Financing Health System Recovery

Integrated systems cannot function without sustained domestic fiscal commitment. Pre-war public health expenditure of approximately 6.5% of total government spending in Sudan is incompatible with effective recovery or resilience (World Bank, 2022–2025). A phased increase toward the 15% Abuja Declaration target is required to rehabilitate district hospitals, strengthen primary care, secure essential medicines, and stabilise the health workforce (World Health Organization, 2011). In addition to domestic investment, emergency and recovery resource mobilisation with a flexible funding mechanism, applying recommendations for health financing in fragile and conflict-affected contexts, is necessary in the recovery stage (Kruk et al., 2010; Intergovernmental Authority on Development, 2025). International evidence consistently demonstrates that external assistance is most effective when it complements rather than substitutes for domestic investment (World Health Organization, 2010). Any investment in health system recovery should be sustainable, efficient, transparent, and properly allocated to address the root causes of inequality across population segments, focusing on the most vulnerable groups and regional inequities, including urban-rural disparities (Kruk et al., 2018; Kruk et al., 2010).

Donor Integration, State-Level Health Mapping, and Service Rationalisation

Coordinated Donor Engagement at State Level

Post-conflict recovery in Sudan requires systematic coordination among international donors, UN agencies (WHO, UNICEF), international NGOs, global financing mechanisms, and Sudanese medical diaspora organisations (Elamin et al., 2024; Elnaiem, Mohamed-Ahmed and Abdalla, 2023). While humanitarian parallelism was necessary during acute conflict, its continuation into recovery risks perpetuating fragmentation. All externally funded health interventions and investments should be aligned with state-level health plans operating within the IHAS framework (Elnaiem, Mohamed-Ahmed and Abdalla, 2023; Intergovernmental Authority on Development, 2025). Federal and state Ministries of Health should jointly convene donor coordination platforms to allocate interventions geographically based on population need and ensure complementarity between humanitarian, recovery, and development programming (Kruk et al., 2010).

State-Level Health Mapping and Investment Plan

A core planning requirement is the development of a comprehensive health map and plan for each state. These maps should describe population size, displacement patterns, disease burden, facility functionality, workforce availability, and referral needs (Elamin et al., 2024; WHO Regional Office for the Eastern Mediterranean, 2024). Such mapping provides a shared evidence base for domestic and donor investment and supports equitable resource allocation.

National and Regional Centres of Excellence

As a direct result of the war and the displacement of healthcare workers from Khartoum, many tertiary care services moved to stable states, offering a level of service previously absent in those regions. Post-conflict reconstruction should preserve and strengthen functioning referral and tertiary centres outside the capital (Elamin et al., 2024; Ahmed et al., 2024). The experience of cardiac and oncology centres in Merowe and Kassala demonstrates that high-quality specialised services can be delivered beyond the capital when appropriately supported (Ahmed et al., 2024). All states should host at least one referral centre scaled up to population need and integrated into a national referral network, reducing patient migration to Khartoum and reinforcing state ownership of specialised services (Ahmed et al., 2024; Elnaiem, Mohamed-Ahmed and Abdalla, 2023).

Reimagining Health Services in Khartoum

According to the International Organization for Migration (IOM) DTM Sudan Mobility Update of 5 February 2025, approximately 11.5 million people are internally displaced in Sudan (International Organization for Migration, 2025). Khartoum has lost an estimated 3.6 million residents (around 30% of its population) bringing it to roughly 4.5 million. In contrast, several states have experienced substantial population influxes: Gadarif has increased by 1.4 million to 3.4 million; Kassala by 0.4 million to 2.9 million; Northern State from 0.9 million to 1.4 million; Nile State from 1.5 million to 2.3 million; White Nile from 2.5 million to 3.2 million; and Red Sea State from 1.4 million to 1.5 million (International Organization for Migration, 2025). Strengthening health systems in the receiving states is justified, while efforts to restore pre-war service configurations in Khartoum should be approached with restraint.

Khartoum should not revert to its pre-war health service configuration, which was characterised by overcrowding, duplication, and weak primary care (Kruk et al., 2010). Over the past two decades, millions of people, many of whom are living in informal settlements and precarious economic conditions, have settled in and around the capital, contributing to rising disease burden, increased pressure on limited health services, and heightened social vulnerability. One factor driving this concentration has been the lack of specialised services in other states, forcing many patients and families to seek care in Khartoum. This long-standing

centralisation has intensified congestion and placed disproportionate strain on the capital's health system.

Post-conflict health planning should therefore avoid re-establishing Khartoum as the dominant national hub for tertiary care. Instead, Sudan's other major cities require deliberate strengthening, with greater public investment directed toward states outside the capital. Public funds should prioritise rebuilding and expanding services in these regions, while a well-regulated and incentivised private sector can meet demand for elective and specialised care. Such an approach would ease pressure on public facilities and support a more balanced, resilient health system. This public–private mix aligns with global urban health evidence, which shows that unregulated growth in “dominant hubs” often leads to inefficiency and inequity (Brinkerhoff, Wetterberg and Wibbels, 2018).

Integrated Recovery and Priority Interventions

Health recovery is inseparable from the social determinants of health. Sustainable peace, employment, food security, and housing are foundational to effective public health (Elnaiem, Mohamed-Ahmed and Abdalla, 2023; Kruk et al., 2010). For a resilient recovery in Sudan, these must be integrated with universal access to quality education, safe potable drinking water supply, sanitation, and reliable electricity, which are essential for preventing recurrent water-borne disease outbreaks and malnutrition currently devastating displaced populations (UNICEF, 2025; Afrobarometer, 2025).

A central pillar of this recovery is the restoration of maternal and child health (MCH) services. Conflict has precipitated a severe crisis, leaving over 2.6 million women of reproductive age in urgent need of assistance and millions of children at risk of wasting and vaccine-preventable diseases (World Health Organization, 2026; UNICEF, 2025). Recovery must prioritise emergency obstetric and newborn care, routine immunisation, and nutritional screening to reverse the surging rates of maternal and neonatal mortality (World Health Organization, 2026; Miskeen, 2024). Simultaneously, the system must address the growing burden of common and chronic diseases. Displacement and service disruption have severely compromised the management of non-communicable diseases like diabetes and hypertension, leading to high rates of complications and mental health co-morbidities (Alsoukhni et al., 2025; World Health Organization, 2024).

Furthermore, the recovery framework must enable the population to benefit from media and digital technology. Access to reliable information via digital platforms and community media is critical to decrease ignorance, counter misinformation, and enhance health literacy (Kickbusch et al., 2013; Afulani and Aborigo, 2025). Priority post-conflict interventions should therefore include large-scale environmental vector control, mental health and psychosocial support, physical rehabilitation for war-related injuries, and integrated sexual and reproductive health services (Kruk et al., 2010; World Health Organization, 2024).

Governance Reform and Legislative Anchoring

To safeguard recovery from political volatility, Sudan should develop a National Health Security and Fiscal Commitment Act, embedding health financing and administrative integration within the post-conflict legal framework (Elnaiem, Mohamed-Ahmed and Abdalla, 2023). Legislative anchoring is a vital mechanism to prevent the “policy drift” often seen in fragile states; by codifying health as a right and a security priority, the state can insulate essential services from shifting political agendas and ensure that recovery gains are not reversed by future leadership changes (Kruk et al., 2010; Schulmann et al., 2024). This legal permanence transforms health reform from a temporary project into a foundational state obligation, which is essential for restoring public trust and state legitimacy (Bashier, Hakim and Ahmad, 2025; Kruk et al., 2010).

Core provisions of the Act should include:

- **Fiscal Ratchet Clause:** Mandating progressive annual increases toward the 15% Abuja Declaration target to ensure sustainable domestic funding (World Health Organization, 2011).
- **70/30 Decentralisation Rule:** Legally protecting resource allocation to favour the state and locality levels, ensuring that funds reach the frontline (Elnaiem, Mohamed-Ahmed and Abdalla, 2023).
- **Workforce Protection:** Providing statutory incentives and security guarantees for health personnel serving in underserved or rural areas to prevent attrition (Witter et al., 2017).

Health Workforce Resettlement and Working Conditions

Post-conflict health system recovery in Sudan will not be sustainable without deliberate resettlement of health cadres in rural and underserved areas under safe, dignified, and professionally supportive conditions. Across fragile and post-war contexts, the availability, distribution, and retention of health workers are the strongest predictors of service functionality (Belaid et al., 2023).

Rural Workforce Gaps as a Structural Risk

Before the war, Sudan’s health workforce was disproportionately concentrated in Khartoum and a limited number of urban centres, leaving rural and conflict-affected regions reliant on under-resourced cadres or short-term humanitarian missions. Evidence from Liberia and the Democratic Republic of Congo demonstrates that rebuilding facilities without restoring and retaining staff leads to rapid service failure and wasted investment (Belaid et al., 2023).

Conditions for Sustainable Rural Deployment

International evidence shows that compulsory deployment alone is ineffective. Sustainable rural resettlement requires a “bundled approach” including physical

security, predictable remuneration, housing, and access to continuing professional development (Robinson et al., 2025; Kruk et al., 2018). Rwanda's post-genocide recovery illustrates how combining rural incentives with clear career progression achieved long-term workforce retention and improved health outcomes (Binagwaho et al., 2014).

Alignment with the IHAS

Within the IHAS, workforce planning must be population-based rather than facility-based. Rural service should be embedded as a recognised professional pathway linked to training, promotion, and academic affiliation with state universities, reducing professional isolation and strengthening district-level leadership.

Diaspora Engagement and Transitional Capacity Support

Sudan's extensive medical diaspora represents a critical transitional resource. Structured short-term return schemes, telemedicine, clinical mentorship, and joint appointments aligned with national and state health plans can help bridge workforce gaps during recovery. Post-conflict experiences from Iraq and Sierra Leone show that centrally coordinated diaspora engagement strengthens institutional capacity when integrated into public systems rather than operating in parallel (Rayes et al., 2021).

Financing and Potential Funding Sources

Health workforce resettlement demands sustained, diversified financing. Salary reform, rural incentives, and better living conditions must be backed by a government-funded rise in domestic health spending, with a defined share of the Abuja 15% target directed specifically to the health workforce. External financing should be transitional, harmonised, and aligned with national systems to avoid parallel salary structures that destabilise the public sector (Kruk et al., 2010; Witter et al., 2017). Potential other funding sources include:

- **Multilateral and UN Agencies:** The World Bank (through the SHARE project, which approved \$182 million in 2025 for health recovery), WHO, UNICEF, and the African Development Fund (\$55 million SHEIP agreement in late 2025) (World Bank, 2025; African Development Fund, 2025).
- **The Global Fund:** As a cornerstone of Sudan's health financing, the Global Fund has invested millions since 2002. In 2024–2025, it continued to provide lifesaving treatment and support for mobile clinics via UNDP and UNICEF (The Global Fund, 2025; UNDP Sudan, 2024). This investment must be scaled and programmed to strengthen district-level health delivery rather than solely vertical disease programs.
- **Bilateral Donors:** Including the EU, UK (FCDO), USAID, and Gulf partners

like the Qatar Fund for Development (QFFD), which pledged \$75 million in 2025 for humanitarian and health recovery (Qatar News Agency, 2025).

- International NGOs: Groups like MSF, Save the Children, and the IRC, which are transitioning from emergency relief to health system recovery roles.
- Philanthropic Foundations: The Islamic Development Bank (IsDB) and the Gates Foundation, focusing on human capital and infrastructure (Islamic Development Bank, 2025).
- Sudanese Medical Diaspora: Organisations such as the Sudanese American Physicians Association (SAPA) and groups in the UK, Ireland, and the Gulf. These follow models seen in Somalia and Ethiopia, where diaspora-financed “salary top-ups” and training partnerships supported rural deployment (SAPA USA, 2025; Rayes et al., 2021).

International experience consistently shows that workforce financing is most effective when donor and diaspora contributions complement rather than replace domestic fiscal commitment and are channelled through nationally coordinated frameworks (El-naïem, Mohamed-Ahmed and Abdalla, 2023; World Health Organization, 2024).

Governance, Transparency, and Anti-Corruption Benchmarks

To ensure that health financing reaches its intended beneficiaries, Sudan must implement robust transparency and accountability frameworks. Drawing on benchmarks from countries like Rwanda and developed nations within the OECD, the government should adopt open-contracting standards and digital financial management systems to minimise leakages and fight the “ghost worker” phenomenon (United Nations Development Programme, 2025; Transparency International, 2024). Effective governance requires political responsibility, where leaders are held legally accountable for the equitable distribution of resources, supported by independent audits and whistleblower protections (Kruk et al., 2010; Afulani and Aborigo, 2025). Furthermore, community engagement through participatory budgeting and local health committees acts as a vital “bottom-up” check on corruption, fostering trust and ensuring that health spending aligns with the actual needs of the population (World Health Organization, 2017; Østby, Nordås and Rød, 2009).

Decentralisation, Equity, and Peacebuilding: University-Led Regional Health Hubs

Decades of Khartoum-centred development have produced profound regional inequities that contributed to conflict. Evidence shows that unequal distribution of public services increases conflict risk, while equitable decentralisation supports stability (Østby, Nordås and Rød, 2009; Justino, Brück and d’Errico, 2024). Health services are particularly salient signals of state legitimacy; in post-conflict settings,

the visible and equitable restoration of primary care can rebuild the social contract between the state and its citizens (Justino, Brück and d’Errico, 2024; Kruk et al., 2010).

Within this framework, community medicine and public health departments in state universities represent a critical, underutilised asset. Rather than serving solely as sources of graduates, these rural universities must be positioned as active hubs for preventive health services (Frenk et al., 2010). By leveraging their academic expertise to lead decentralised surveillance and evidence-informed planning, they provide the “intellectual capital” necessary to adapt health interventions to local ecological and social contexts (Bashier, Hakim and Ahmad, 2025; Walsh et al., 2025).

A key priority for these institutions should be the establishment of specialised disease registries (e.g., for diabetes, cancer, or maternal outcomes) at the university level. International evidence from rural health multidisciplinary training models shows that university-led registries provide the technological and data-driven entry point for quality chronic disease management and automated health auditing (RUPRI Center for Rural Health Policy Analysis, 2006; Hospital Italiano de Buenos Aires, 2024). This transition from passive education to active service-linked research ensures that state universities become the guardians of regional health data, reinforcing state ownership and driving long-term health equity (Bashier, Hakim and Ahmad, 2025; Frenk et al., 2010).

Importance of Establishing a Strong HIS in Post-Conflict Sudan

Establishing a strong, integrated, and predominantly digital HIS is essential for rebuilding the health sector in post-conflict Sudan, where prolonged instability has fragmented service delivery and weakened governance structures. The routine use of computer screens and electronic platforms for real-time data entry at all levels of care while minimising or eliminating paper-based records can significantly improve data accuracy, timeliness, and accessibility, while reducing loss of records and administrative inefficiencies common in fragile settings (World Health Organization, 2024; Rubenstein, Al-Awaid and Sahloul, 2022).

Effective digitalisation of health records, supported by electronic registration based on national identity and residency, is critical to ensure continuity of care, accurate patient tracking, and equitable allocation of limited health resources (Kruk et al., 2018). Screen-based data capture at points of care facilitates standardised reporting, interoperability between facilities, and automated aggregation of health indicators, which are essential for evidence-based planning and monitoring (Elnaiem, Mohamed-Ahmed and Abdalla, 2023; World Health Organization, 2024).

A well-structured referral system supported by electronic records and defined catchment areas can reduce duplication of services, inappropriate self-referrals, and unnecessary pressure on secondary and tertiary facilities, thereby

improving system efficiency and equity (Kruk et al., 2018; Elnaiem, Mohamed-Ahmed and Abdalla, 2023). The avoidance of paperwork through electronic referrals and digital patient histories further enhances continuity and coordination of care across different levels of the health system (World Health Organization, 2024; AbouZahr and Boerma, 2005).

Furthermore, timely access to reliable electronic health information strengthens disease surveillance, early warning systems, and rapid response to epidemics, functions that are particularly critical in fragile and post-conflict settings such as Sudan (Bashier, Hakim and Ahmad, 2025; Elnaiem, Mohamed-Ahmed and Abdalla, 2023). The use of digital dashboards and screen-based reporting tools enables health authorities to visualise trends, detect outbreaks early, and respond more effectively (Bashier, Hakim and Ahmad, 2025). Investment in robust IT infrastructure, staff training in electronic data entry, and the strategic use of artificial intelligence including predictive analytics for outbreak detection, health system planning, and clinical decision support can further enhance accountability, resilience, and long-term sustainability of the health system during recovery and beyond (Elnaiem, Mohamed-Ahmed and Abdalla, 2023; Wahl et al., 2018).

Health as a Model for Wider Decentralisation Across Sectors

Importantly, the health sector can function as a demonstration model for decentralised development across other sectors. The principles underpinning equitable health planning (population-based allocation, local capacity building, national standards with local autonomy) are equally applicable to agriculture (state-specific investment based on ecological zones), industry, economic planning, and education (Bossert, 1998). International experience shows that sector-wide decentralisation works best when one sector leads and demonstrates feasibility; health is particularly suitable for this role because of its strong data systems, measurable outcomes, and direct relevance to everyday life (Bossert, 1998; Brinkerhoff, Wetterberg and Wibbels, 2018). If decentralised health planning succeeds, it can provide political and technical justification for a broader rebalancing of Sudan's development model away from Khartoum-centric growth (Brinkerhoff, Wetterberg and Wibbels, 2018).

Conclusion

Sudan's post-conflict recovery presents a narrow but critical window to transform a shattered health system into a cornerstone of equity, resilience, and state legitimacy. This paper has argued that recovery cannot be achieved through a return to pre-war centralised and fragmented models, nor through prolonged humanitarian substitution. Instead, a decisive shift toward preventive medicine, IHAS, sustained domestic financing, and legally anchored governance reforms are essential. By embedding health system reconstruction within broader

decentralisation, workforce resettlement, digital transformation, and social development agendas, Sudan can reduce avoidable disease burden, rebalance regional inequities, and rebuild public trust. If strategically led, transparently financed, and nationally owned, health system recovery can serve not only as a pathway to improved population health, but also as a foundation for durable peace, inclusive development, and a renewed social contract in post-conflict Sudan.

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CHAPTER 10

REBUILDING BASIC EDUCATION IN POST-GENOCIDE SUDAN: RECOVERY, RESILIENCE, AND NATIONAL RECONSTRUCTION WITHIN THE SNRF FRAMEWORK

M.Y. Sukkar and Gerard McCann

The genocide and large-scale war that engulfed Sudan after 2023 resulted in one of the most devastating collapses of educational infrastructure in the country's modern history. Schools were destroyed or occupied by armed groups, teachers were displaced or killed, families were uprooted, and millions of children and adolescents were cut off from formal learning. Education was not merely interrupted; it was systematically dismantled as part of the broader destruction of civilian life and social institutions.

Within the Sudan National Recovery and Reconstruction Framework (SNRF), education is not treated as a humanitarian add-on or a technical service sector. It is conceptualised as a pillar of national recovery, social repair, institutional renewal, and genocide prevention. Basic education—encompassing early childhood, primary, and secondary schooling—forms the foundation upon which civic identity, social cohesion, professional capacity, and national continuity are rebuilt.

This chapter reframes education in war-affected Sudan from short-term emergency schooling toward a recovery-centered, rights-based, and institutionally integrated model. It argues that rebuilding basic education is not only a moral obligation toward displaced and traumatised learners but a strategic investment in preventing future cycles of violence, restoring state legitimacy, and reconstructing Sudanese society from below.

The Collapse of the Education System

Armed conflict in Sudan did not merely disrupt schooling temporarily. It produced a systemic collapse of educational governance, infrastructure, and professional networks. Thousands of schools were damaged, looted, or repurposed for military use. Teachers and administrators were displaced internally or forced into exile. Examination systems collapsed, curricula implementation halted, and certification pathways were interrupted. Displacement camps and informal settlements became home to large populations of school-age children without access to structured learning environments. These children faced multiple overlapping vulnerabilities: malnutrition, disease exposure, psychological trauma, and social instability. The breakdown of education thus compounded existing humanitarian crises and accelerated long-term developmental damage.

From the perspective of SNRF, the collapse of education represents not only a service failure but an epistemic and institutional rupture. When education systems collapse, societies lose the capacity to transmit knowledge, ethics, historical memory, and civic norms. This erosion directly contributes to political instability, social fragmentation, and the reproduction of violence across generations.

Basic Education as a Recovery Infrastructure

Within the SNRF framework, basic education is conceptualised as a form of national infrastructure comparable in strategic importance to health systems, water supply, and governance institutions. It functions simultaneously as:

- A stabilising social institution during displacement and return
- A mechanism for psychological recovery and routine restoration
- A platform for civic reconstruction and social cohesion
- A pipeline for rebuilding professional and institutional capacity

Education in post-genocide settings must therefore be designed not only to resume academic instruction but to actively contribute to national recovery. Reopening schools, even in temporary or mobile formats, restores daily structure to children's lives, reduces exposure to exploitation and recruitment into armed groups, and rebuilds community trust. It also creates local employment opportunities for teachers, administrators, and support staff, linking education recovery with economic stabilisation.

Categories of Learners in Post-Conflict Sudan

Post-war Sudan presents a heterogeneous learner population requiring differentiated educational responses.

- **Learners with Interrupted Schooling** - Large numbers of students had already begun formal education before displacement. Their primary need is accelerated reintegration through flexible curricula, bridging programs, and examination re-entry pathways. These learners require academic remediation alongside psychosocial support to address trauma and learning loss.
- **Learners Who Never Entered Formal Schooling** - In conflict-affected and remote regions, many adolescents reached school age without ever accessing education. For this group, recovery programming must include catch-up education, age-appropriate accelerated learning, and literacy programs tailored to older beginners.
- **Early Childhood Learners** - Preschool-age children face unique developmental risks. Early childhood education programs combining play, nutrition support, psychosocial stimulation, and parental engagement are critical for cognitive and emotional recovery.

Recognising these distinct learner categories enables recovery planning that is inclusive, adaptive, and socially equitable.

Education, Trauma, and Psychosocial Recovery

Post-genocide education systems cannot ignore the psychological dimension of recovery. Many learners have witnessed violence, displacement, family separation, and loss. Schools therefore function not only as learning spaces but as sites of emotional stabilisation. Trauma-informed education approaches include:

- Training teachers in basic psychosocial support
- Integrating arts, storytelling, and group activities
- Creating safe spaces for dialogue and emotional expression
- Establishing referral pathways to health and mental health services

Within SNRF, education is linked structurally to primary health care and community-based support systems through Smart Village integration, ensuring that learning environments also serve as entry points for social protection and health services.

Nutrition, Health, and Learning Integration

Educational recovery in Sudan cannot succeed independently of nutrition and health interventions. Malnutrition, parasitic infections, anemia, and untreated chronic conditions severely undermine learning capacity. School-based nutrition programs, including milk provision and daily meals, improve attendance, cognitive performance, and family engagement. School health programs provide basic screening, immunisation referral, hygiene promotion, and disease prevention. The original humanitarian education models emphasised the integration of education with mobile clinics and nutrition services. SNRF expands this approach by embedding education within community health infrastructure under the Smart Village model, ensuring sustainability beyond emergency phases.

Teachers as Recovery Agents

Teachers occupy a central role in post-conflict recovery. They are not merely content deliverers but social leaders, role models, and community stabilisers. However, Sudan's teaching workforce has suffered massive attrition due to displacement, insecurity, and economic collapse. Recovery requires:

- Emergency teacher recruitment and redeployment
- Accelerated training for community educators
- Psychosocial support for educators themselves
- Professional re-certification pathways

SNRF emphasises rebuilding professional communities as part of institutional renewal. Teacher networks, peer mentoring, diaspora engagement, and remote training platforms can support workforce restoration even during instability.

Governance and Local Ownership of Education Recovery

Centralised education systems collapsed alongside the state. Recovery therefore requires a shift toward polycentric governance, where communities, local councils, and national institutions share responsibility.

At the village and locality level, education committees can:

- Monitor school reopening
- Coordinate community contributions
- Support teacher accommodation and security
- Promote girls' enrolment and retention

At the national level, ministries provide standards, certification frameworks, curriculum guidance, and resource mobilisation. This governance architecture reflects SNRF's model of grassroots democracy linked to national coordination.

Curriculum Reform and Civic Reconstruction

Post-genocide education must go beyond restoring pre-war curricula. Recovery offers an opportunity to redesign learning content to strengthen:

- Human rights education
- Civic responsibility and participation
- Peace education and conflict resolution
- Historical awareness and memory preservation
- Cultural pluralism and national unity

Embedding these themes in basic education transforms schools into sites of civic reconstruction rather than passive service institutions. This aligns with SNRF's vision of education as epistemic reconstruction and genocide prevention infrastructure.

Examination Systems and Certification Recovery

Interrupted examination systems represent a major barrier to educational continuity. Students unable to sit for standardised exams face long-term exclusion from higher education and employment. Recovery strategies include:

- Temporary examination centers in displacement areas
- Flexible documentation requirements
- Regional exam hubs supported by mobile education teams
- Recognition of interrupted schooling through equivalency programs

Re-establishing credible certification pathways restores institutional trust and incentivises student re-enrolment.

Infrastructure, Temporary Learning Spaces, and Smart Villages

Physical school reconstruction will take years. Interim solutions are therefore essential. These include:

- Temporary learning shelters
- Modular classrooms
- Mobile education units
- Community-shared facilities

Within SNRF, Smart Villages provide integrated infrastructure platforms where education, health, water, and energy systems are co-located. This reduces operational costs, improves service coordination, and strengthens community ownership.

Education Financing and Sustainability

Sustainable recovery requires predictable financing beyond humanitarian cycles. Education funding should combine:

- National budget allocations
- International reconstruction grants
- Diaspora contributions
- Community co-financing mechanisms

SNRF emphasises aligning donor funding with national recovery priorities, avoiding fragmented project-based interventions that undermine institutional coherence. Perhaps the most strategic function of basic education lies in its preventive role. Education systems shape identity, ethics, political awareness, and social belonging. When inclusive and rights-based, they reduce vulnerability to extremist narratives, ethnic polarisation, and political manipulation.

Education Delivery in War-Affected and Displacement Settings

The care of children and the other weaker factions of the population in war-affected areas presents an enormous responsibility to national organisations and the international community, its various organisations as well as NGOs. It is obvious that the warring factions do not care and may even use the situation as one of their strategies to defeat their opponents. Therefore, it remains the responsibility of those who really care to provide the essential services. Top-most are: food, water and shelter. However, the health and education of children stand out as one of the top priorities in war torn countries.

The families targeted are usually residents of refugee camps or displaced communities around cities and villages. Of particular importance is to bridge the gap in children's education especially when the conflict is prolonged and may span several school years. The education of children in refugee camps or the temporary dwellings of the displaced, is probably one of the most challenging but essential of their needs. What we need to address are the needs and strategies for meeting the educational needs of children from age 4 to 12. However, regular provision of education for children is best provided together with the nutritional and health needs as well. The following will outline the needs and strategies to tackle this complex situation.

Categories of Children in Need

We can identify three categories of children with different educational needs. 1. some have already started school and whose education was interrupted by the war, and 2. Those who are of school age but, for various reasons, have not started regular education at all, and the third category is preschool children. Taking this classification into consideration, the educational needs of each category shall hopefully be addressed with appropriate detail. A census to identify the targeted groups is a good starting point at the planning stage. The number of children in the various categories will determine their educational, nutritional, and health needs. For each locality, there should be a core administrative setup to manage the activities and determine the needs of the programs adopted to satisfy the needs of each camp or community. The educational activities for each group will be outlined as follows:

Preschool children: This group needs special care that is not easy to provide, mainly because of their age and the scarcity of qualified personnel in this field. Their programs are usually a mix of learning and play. It will take an imaginative educator to design a suitable preschool program for these displaced children, taking into consideration their social and cultural background and the conditions under which they are living.

School children: This group will be relatively easy to deal with because they have already attended part of a known school curriculum. The books should not be a problem as these are already well known. However, they will need well-grounded, flexible and willing teachers capable of adapting to the special needs of the situation e. g. adapting to the environment and teaching several subjects. One of the needs of this group is to prepare them for the exams that lead from one stage to another and to facilitate their attendance at the nearest examination centres.

Children of school age who have not gone to school before: It is expected that in remote areas of armed conflicts there would be a large number of children who have not had the opportunity to go to school for a variety of reasons. Their special

needs should be categorised and documented for planning their classes and follow-up. For this category, this is an opportunity that must not be missed. This group is best divided into several classes according to their age; and appropriate lessons are planned accordingly.

Other Strategic Activities

For this program to succeed, there are several supporting activities that must be provided.

Advocacy for the programs: The targeted communities and neighbouring localities need to know about the program objectives and facilities. The information provided should coincide with their perceived and expected educational needs of their children. Information should be provided through media and suitable illustrative material. Health and nutrition benefits should be included in the canvassing programs. It will be advisable and pertinent to the objectives of the project to employ local personnel who will be able to convey the project's objectives and benefits more eloquently than those coming from other places and cultures.

Deployment of educational staff and supplies: The management of the programs will attend to the staff employed, the residence and transport needs of each station according to gender and the level of education they provide.

Supervision of the educational processes: The project will need a system of supervision and feedback reporting, to foresee and report on the resources and activities of the programs in the various localities according to an evaluation process for each component of the program. The evaluation should include the resources, the performance and degree of dedication of the personnel providing the services as well as a cost-benefit analysis. Data gathering should include feedback from a sample of beneficiaries.

Provision of mobile clinics: It is expected that there will be one big camp or several camps served by each program. Therefore, it will be more practical and cost-effective to have mobile clinics manned by a doctor and qualified nurses or medical assistants to visit each educational facility periodically. If the size of the camp is too large, two resident doctors and two nurses should be provided. The services offered should be decided by medical service personnel with experience in the locality or similar situations.

Schools' Nutrition Program: It is expected under these conditions that the nutritional status of children will have suffered to various degrees. The first step in the management of this aspect of the service is to conduct a nutritional assessment survey. Volunteer Health care personnel and medical students can be recruited for

this purpose to identify the various stages and types of malnutrition. Provision of milk and a midday meal for all should help prevent further occurrence of malnutrition.

Arrangement for visits by education personnel, doctors and nutritionists: The project should include arrangements for visits by doctors and nutritionists for periodic assessment and evaluation of the various program components. In this respect the administration is advised to coordinate with the health services giving authorities or volunteer organisations in the situation, as the case may be.

Facilitation of exams to comply with standards: All exams should comply with the current standards adopted by the Ministry of Education. They should be conducted and supervised by qualified teachers with the approval of the nearest education authority.

Water and other services: These include provision of water supplies, fuel, mobile laundry and suitable latrine services.

Schools' Health Program

It is of utmost importance to set up a School Primary Health Care facility as part of the project. Children in the educational program should receive a health check for skin and general wellbeing, lab tests for anaemia and parasites, so as to decide on appropriate supplements or treatment. The project authority is advised to enlist the assistance of health authorities or health care givers in the locality, to plan a preventive health care program. For the program children, and for that matter their sibling infants, should be provided with nutritional support, immunisation and vitamin supplements.

Human Resources

The human resource is probably the most important and challenging element in this project. Workers in the field of education are the change agents in society. Their behaviour and attitudes will reflect on the outcomes of their educational and services activities. One of the root causes of conflicts is the lack of or poor recognition and respect for cultural diversity. In war-torn areas citizens will have preconceived ideas on this subject which may be considered a sensitive issue and should be avoided. Training programs for workers in humanitarian organisations will need training that gives stress and due consideration to this issue.

Employees for the program should come as far as possible from the camp residents. This is particularly important for the selection of teachers who may themselves be displaced or can be recruited from the same cultural group as the camp residents. They will have the advantage of communication and cultural acceptance. Crucial to the recovery of education are:

Teachers - The number of teachers and their qualifications shall be determined according to the camp statistics. A senior teacher should be given the responsibility of overseeing all matters related to the educational component of the program.

Health services personnel - Mobile clinic: Driver, Doctor preferably female, Trained Nurse. The school health service should coordinate with the camp's health care facilities.

Nutritionist - A trained nutritionist who should be supervised by the camp Doctor. His/ her job description should be specified according to the planned needs of the camp community.

Management - Program Director, Assistant Director, secretary, accountant and an IT records keeper.

Supporting personnel - Drivers, cleaners, etc are important for the functioning of schools.

Logistics officers - The project will need logistic support in all three tiers of its activities.

Facilities and Supplies

The project will need to supply the following:

- Suitable mobile or temporary accommodation facilities for the educational and health provision activities such as tents and no-pillars domes for classrooms
- Suitable accommodation for the required personnel.
- The project will need suitable transport, according to the needs of children and personnel.

For example, Fuel as required. Water for the program facilities for drinking and household use as well as reservoirs and filters are essential in areas where water is scarce or may be contaminated. Logistics to supplement existing or deficient support for environmental Health e.g, waste disposal and sanitation facilities e.g. collection facilities and combating the breeding of mosquitoes and flies.

Project Management

It is clear from the above scope of activities that both educational and child health aspects of the project should be represented. It is also pertinent to consider the policies of organisations and donors in similar situation. It is suggested that a core

management setup should be established. The project should also have visits from a higher authority to check that the objectives of its various components are closely followed. For example, the newly established camps near Eldabba in the Northern State is a suitable place to start and learn by practicing what we preach. First, it is located in a friendly locality with a supportive community. Second, the area is far afield from the battle grounds. Third, the camps are new and well organised. Fourth, the displaced community is composed mainly of women and children. Fifth, the camps have received much attention and press coverage, an advantage that can help raise financial and material support. Sixth, being away from military operations, will favour the recruitment of volunteers for the various aspects of the program.

Conclusion

It is clear from the above that the issue of education in war torn-areas and in the camps of the displaced, is not a simple matter. This paper is intended to help clarify the complexity of the situation and the nature of required help. It is also intended to help organisations to raise funds from charities and governments. By restoring historical consciousness, promoting critical thinking, and reinforcing shared civic values, education becomes a structural safeguard against future atrocities. Rebuilding basic education in post-genocide Sudan is not a technical exercise in reopening schools. It is a foundational pillar of national recovery, institutional renewal, and long-term peace.

Within the Sudan National Recovery and Reconstruction Framework, education is repositioned as recovery infrastructure—integrated with health, governance, cultural renewal, and economic reconstruction. By investing in inclusive, resilient, and community-rooted education systems, Sudan can transform trauma into resilience and devastation into renewal. The future of Sudan's recovery will not be determined solely by political settlements or physical reconstruction. It will be shaped in classrooms, community learning spaces, and the everyday interactions through which children and youth rebuild trust, knowledge, and shared national purpose.

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PART IV
ENVIRONMENT, ENERGY, AND
ECOLOGICAL RECOVERY

CHAPTER 11

WATER SECURITY AND TOXIN-FREE RECOVERY

Faisal Abdalla Sinada

As Sudan embarks on a complex and arduous path of post-conflict reconstruction, the paradigm of water security must move decisively beyond a narrow focus on volumetric availability to address what this chapter defines as the ‘*invisible threshold*’ of biological toxicity. This chapter introduces the Water-Security Module of the Smart Village Network (SVN), an operational framework designed to democratise safety through decentralised, village-level infrastructure.

In remote rural regions of Darfur, Kordofan, Kassala, and the Blue Nile, the *haffir* (روبي فجلا) - a traditional rainwater harvesting basin—remains the primary lifeline for marginalised populations that have been structurally excluded from national water investments since independence in 1956. Yet these stagnant water bodies function as unintended bioreactors for toxigenic cyanobacteria, driven by rising ambient temperatures, seasonal nutrient loading, and agricultural runoff. The absence of documented cyanotoxic events in Sudan is therefore best understood as an *absence of evidence*, rather than *evidence of absence*, masking a significant and under-recognised public health and livestock risk (Sedgwick, 2014).

The chapter proposes a transition from reactive crisis management to a proactive framework of *Conjunctive Quality Management*. By modernising the *haffir* into a *Smart Haffir*, the SVN integrates nature-based engineering—such as vegetated nutrient buffer zones and solar-powered aeration—with low-cost Internet of Things (IoT) sensing. Using LoRaWAN technology, real-time biological risk alerts are generated locally, bypassing reliance on distant, often inaccessible laboratory infrastructure. By embedding biological security into national recovery architecture, the SVN offers a scalable, scientifically grounded roadmap for donors and policymakers to safeguard human health, livestock systems, and the dignity of rural citizenship in post-conflict Sudan.

Water Resources in Sudan: The Crisis of Scarcity and Stress*Hydrological Constraints*

Sudan’s hydrological landscape is defined by a precarious triad: highly localised rainfall, limited and unevenly distributed groundwater, and dependence on the transboundary Nile system (Sinada & Haggaz, 2006). While Nile waters dominate international geopolitical discourse—most recently through negotiations surrounding the Grand Ethiopian Renaissance Dam (GERD)—the day-to-day

survival of rural and pastoralist communities depends on far more fragile and localised water balances.

Total renewable freshwater replenishment in Sudan is estimated at approximately 1.3 km³ per year (FAO, 2005), a volume insufficient to meet the demands of a post-conflict population seeking to rebuild agricultural and pastoral livelihoods. The severity of this constraint is best illustrated using the Falkenmark Water Stress Index, which defines water scarcity as annual availability below 1,000 m³ per capita and absolute scarcity below 500 m³ (Falkenmark, 1989; Damkjaer & Taylor, 2017). Sudan's current per capita availability is estimated at approximately 700 m³ annually (UNEP, 2020), placing the country firmly within the water-scarce category.

Regional studies further reveal sharper deficits. In several Nile-adjacent and semi-arid corridors, per capita availability has fallen to around 600 m³ (Hamad, 1998; El-Battahani, 2005). These quantitative shortages are compounded by progressive qualitative degradation of accessible water sources. As a result, Sudan faces not only a crisis of water quantity but a deepening crisis of water safety—one that directly threatens public health, food security, and post-conflict recovery.

Historical Marginalisation of Water Development

The history of water development in Sudan is inseparable from the history of political marginalisation. During the Anglo-Egyptian Condominium, hydraulic engineering investments were concentrated almost exclusively along the Nile to serve the Gezira Scheme and the colonial cotton economy. Major infrastructures such as Sinnar Dam (completed in 1925) and later Roseires Dam (1966) were designed to secure export revenues and benefit riverine elites, while western and eastern regions were left dependent on traditional rainwater harvesting systems.

Following independence in 1956, successive governments in Khartoum largely reproduced this river-centric development paradigm. Darfur, Kordofan, Kassala, and large parts of the Blue Nile region remained structurally excluded from modern water infrastructure, relying instead on hand-dug *haffirs*. Rural communities were thus pushed into a condition of *hydro-precariousness*: responsible for capturing their own water, yet deprived of the technical, financial, and institutional support necessary to ensure its safety.

This neglect was not accidental. It reflects the logic of a centralised political economy that historically viewed peripheral regions as zones of resource extraction rather than as citizen-inhabited territories deserving equitable public investment. Within this context, water security must be understood as a dimension of social justice. In the Smart Village framework, reclaiming local control over water safety constitutes an act of decolonisation—returning biological security and dignity to communities long excluded from the national development compact.

Haffir System: Indigenous Water Infrastructure

For marginalised rural populations—particularly in the semi-arid belts of Darfur, Kordofan, Kassala, and the Blue Nile—annual rainfall is confined to a brief four-month window between July and October, often totalling no more than 300–500 mm (El-Tom, 1975). In this climatic context, the *haffir* (also locally known as *fula* (فلوف) or *turda* (تدرت)) has historically functioned as the primary indigenous rainwater harvesting technology.

Traditional *haffirs* were hand-excavated basins ranging from 500 to 10,000 m³ in capacity (Rima & Hanspeter, 2013). Contemporary engineering interventions have expanded these structures to volumes exceeding 100,000 m³ (UNICEF, 2009). However, while storage capacity has increased, safety has not. Most *haffirs* remain open, stagnant reservoirs exposed to animal waste, sediment inflow, and agricultural runoff, rendering them highly vulnerable to biological degradation (WHO, 2008).

In the post-conflict reconstruction period, *haffirs* are frequently rehabilitated using outdated twentieth-century designs that fail to address twenty-first-century biological risks. This disjunction forms the central problem addressed by the Smart Village Network: how to preserve the cultural and functional value of the *haffir* while transforming it into a biologically secure infrastructure fit for long-term recovery.

Water Security as Social Justice

To understand the Smart Village Network (SVN) approach to water security, it is essential to situate water within the broader political economy of inequality and post-conflict recovery. In the Sudanese context, water is not a neutral or purely technical resource; it is a medium through which power, exclusion, and vulnerability are reproduced. When water becomes biologically unsafe, the burden of disease, livestock loss, and economic insecurity falls disproportionately on the poorest households—those least able to purchase treated water, travel to distant clinics, or absorb the shock of livestock mortality.

Conventional water-security frameworks have prioritised access (distance to source) and quantity (litres per capita per day). While these dimensions remain important, they are insufficient in contexts where water is readily available but biologically hazardous. The SVN reframes water security as a question of social justice: who bears the biological risks embedded in infrastructure, and whose lives are implicitly valued through design decisions.

Biological Sovereignty

This chapter introduces the concept of *Biological Sovereignty* to describe the right of a community to access water that is safe from both anthropogenic pollutants and naturally occurring toxins. Biological Sovereignty extends beyond the legal notion of water rights to encompass the protection of human and animal health at the molecular and cellular level.

In rural Sudan, the absence of safeguards against biological toxicity effectively relegates marginalised citizens to second-class biological status. While urban populations benefit from treated piped water and regulatory oversight, rural communities are expected to tolerate chronic exposure to unsafe sources as an acceptable cost of underdevelopment. The SVN rejects this implicit hierarchy by embedding safety directly into infrastructure design rather than treating it as an optional or post hoc intervention.

By operationalising Biological Sovereignty at the village level, the Smart Village model decentralises not only water access but also the authority to determine when water is safe to drink. This shift transforms water users from passive recipients of risk into active custodians of their own biological security.

Water Security and Peacebuilding

In post-conflict regions such as Darfur and parts of Kordofan, water insecurity is frequently the first destabilising factor in cycles of violence. When a *haffir* becomes contaminated or unusable due to algal blooms or turbidity, pastoralist groups are forced to migrate earlier than planned in search of alternative sources. These premature movements bring herds into contact with cultivated land, triggering disputes that can escalate rapidly in the absence of effective local governance.

By securing the biological safety and reliability of local water sources, the SVN functions as a form of *peace infrastructure*. Trust in water availability reduces the pressure for reactive migration and allows communities to adhere more closely to negotiated grazing routes and seasonal agreements. In this sense, water safety is not merely a health intervention but a stabilising force that underpins social cohesion and conflict prevention.

The Invisible Toxicity Threshold

The concept of the '*invisible threshold*' captures the point at which water availability ceases to guarantee water safety. In many Sudanese rural settings, *haffirs* appear visually acceptable—often clear enough to drink—yet may contain biologically active toxins that pose serious risks to humans and livestock. This hidden danger is particularly acute in stagnant surface-water systems subject to seasonal nutrient loading and high ambient temperatures.

Cyanobacteria and Cyanotoxins

Cyanobacteria, commonly referred to as “blue-green algae,” are among the oldest photosynthetic organisms on Earth. In the context of Sudanese *haffirs*, genera such as *Microcystis*, *Anabaena*, and *Planktothrix* thrive in warm, stagnant, nutrient-rich environments created by seasonal runoff and prolonged dry periods (Paerl et al., 2001). These organisms are capable of producing a range of potent cyanotoxins that have been widely documented in surface waters across Africa, Asia, and Latin America.

Cyanotoxins are commonly categorised into three groups:

- *Hepatotoxins*, particularly microcystins, which target the liver and are associated with acute liver failure and increased long-term risk of hepatocellular carcinoma following chronic exposure (Davis & Shaw, 2009).
- *Neurotoxins*, such as anatoxins, which interfere with neuromuscular transmission and can cause respiratory paralysis and rapid death in cases of high exposure—posing a severe risk to livestock drinking directly from contaminated water edges.
- *Dermatotoxins*, including lyngbyatoxins, which cause skin irritation, rashes, and allergic reactions following contact.

The health implications of these toxins are well established internationally, yet they remain largely unrecognised within Sudan's rural water governance frameworks.

Nutrient Loading and the “First Flush”

The hydro-biological risk in semi-arid Sudan is intensified by extreme rainfall seasonality. During the prolonged dry season, animal waste, fertiliser residues, and organic debris accumulate across catchment areas. The onset of the rainy season triggers a powerful “first flush” effect, washing concentrated loads of nitrogen and phosphorus into *haffirs* (Amara & Saad, 2014; UNDP, 2006).

This sudden nutrient influx, combined with high temperatures and stagnant conditions, creates ideal circumstances for rapid cyanobacterial proliferation. The resulting blooms often occur early in the storage cycle, when communities are most reliant on freshly collected water. Without monitoring systems, these events go undetected until visible scums appear or illness occurs.

Bloom Collapse and Toxin Release

Cyanotoxin risk peaks through two distinct biochemical pathways. In the first, toxins remain sequestered within intact cyanobacterial cells. While the water may appear visibly green, toxicity may be reduced if cells are physically removed through filtration (Simis et al., 2005). The second pathway is far more dangerous. When blooms collapse due to nutrient depletion, temperature shifts, or inappropriate chemical treatment, cells rupture and release dissolved toxins into the water column (Simis et al., 2007). Paradoxically, water may appear clearer at this stage, leading communities to believe it has become safer, while dissolved toxin concentrations actually increase. This phenomenon underscores the inadequacy of visual inspection as a safety indicator and highlights the necessity of real-time biological monitoring.

Evidence Gaps and Hidden Risk

To date, cyanotoxins have not been systematically measured in Sudanese *haffirs*. This absence of data reflects a structural deficit in laboratory capacity, research funding, and surveillance rather than a lack of risk. Under-equipped regional laboratories and prolonged institutional disruption have produced a persistent data vacuum. As Sedgwick (2014) notes, absence of evidence must not be mistaken for evidence of absence. The Invisible Threshold thus represents a critical blind spot in Sudan's water-security landscape—one that demands precautionary, design-based intervention rather than retrospective crisis response.

The Smart Village Water Security Model

A *smart village* is defined as a rural community that advances its development trajectory through the strategic use of digital innovation, decentralised infrastructure, and locally governed services (Holmes & Thomas, 2015; Adesipo et al., 2020). Within this framework, the Smart Village Network (SVN) positions water security not as a standalone sector, but as a foundational recovery system that links health, livelihoods, peacebuilding, and governance.

The SVN Water-Security Module responds directly to the Invisible Threshold of biological toxicity by embedding prevention, detection, and response mechanisms into village-scale infrastructure. Rather than relying on distant laboratories or episodic inspections, the model operationalises *Conjunctive Quality Management*, integrating ecological design, renewable energy, and real-time digital sensing.

The Smart Haffir Concept

The core intervention proposed by the SVN is the transformation of the traditional *haffir* into a *Smart Haffir*. This transformation is achieved through the integration of three mutually reinforcing components.

Nature-Based Engineering (Biological Buffers).

Vegetated buffer zones are established around the *haffir* perimeter using indigenous and phytoremediative plant species such as *Vetiveria zizanioides*. These buffer strips function as biological filters, intercepting sediment, animal waste, and nutrient-rich runoff before it enters the water body. Empirical studies demonstrate that such systems can significantly reduce nitrogen and phosphorus loads, thereby suppressing the conditions that favour cyanobacterial blooms (Smeal & Truong, 2006).

Solar Aeration Systems

Cyanobacteria thrive in stagnant, stratified, and low-oxygen environments. Solar-powered submerged aeration systems disrupt thermal stratification, maintain aerobic conditions, and inhibit the anaerobic processes associated with

toxin production. By coupling aeration to off-grid solar arrays, the Smart *Haffir* maintains functionality even in remote or conflict-affected areas without grid access.

IoT Monitoring and Early Warning

Low-cost, solar-powered Internet of Things (IoT) probes replace dependence on distant laboratory testing. Sensors continuously monitor proxy indicators of biological risk, including phycocyanin concentration (algal density), turbidity, pH, dissolved oxygen, and temperature. These data streams enable early detection of bloom formation long before toxins reach dangerous concentrations. Together, these components convert the *haffir* from a passive storage basin into an actively managed biological system. The specific engineering architecture optimised for Sudanese environmental conditions is detailed in Appendix A.

LoRaWAN Connectivity

Connectivity remains a major constraint in remote regions of Darfur, Kordofan, and the Blue Nile, where cellular networks are often unreliable or non-existent. To address this, the SVN adopts LoRaWAN (Long Range Wide Area Network) technology, a low-power communication protocol capable of transmitting sensor data over distances exceeding 15 km with minimal energy requirements (Saravanan et al., 2017; Khairullah et al., 2025). Sensor data are translated into actionable, locally intelligible outputs:

- *Immediate SMS alerts* to trained Village Water Stewards
- *Visual LED “traffic-light” indicators* at water collection points:
 - Green: Safe for use
 - Yellow: Caution (boiling or restricted use)
 - Red: Unsafe (do not use)

This approach bypasses the need for centralised decision-making and allows communities to respond in real time to emerging biological threats.

Data Sovereignty and Community Governance

A defining principle of the SVN is *Data Sovereignty*: the right of a community to own, access, and act upon data generated within its territory. In conventional models, water-quality data are extracted upward to central ministries, often with limited feedback to the populations most at risk. Under the SVN, data ownership resides with village water committees. Women and children—who bear primary responsibility for water collection—gain direct access to safety information, enabling informed decision-making at the household level. This redistribution of knowledge power transforms data from an extractive bureaucratic tool into an instrument of everyday protection and dignity.

Governance and Institutional Reform

While technological innovation is essential, the sustainability of water security interventions in Sudan ultimately depends on institutional coherence and governance reform. The current architecture of water governance is characterised by fragmented mandates, weak coordination, and chronic loss of technical capacity—conditions that have been further exacerbated by prolonged conflict.

Fragmented Water Governance

Responsibility for water governance in Sudan is divided across multiple institutions with limited integration. The Ministry of Irrigation and Water Resources (MoIWR) focuses primarily on volumetric supply and hydraulic infrastructure, while the Ministry of Health (MoH) addresses disease outcomes rather than upstream prevention. No single institution holds a clear mandate for *biological water security*, leaving toxin monitoring, risk assessment, and preventive design largely unaddressed.

Brain Drain and Capacity Loss

This institutional fragmentation is compounded by severe human-capital depletion. The emigration of engineers, hydrologists, microbiologists, and public-health specialists—accelerated by the 2023 conflict—has hollowed out technical capacity at both national and state levels. As a result, even when policies exist on paper, implementation capacity remains weak.

Academic–Governmental Partnerships

To address this gap, the SVN proposes the establishment of an *Academic–Governmental Bridge*. This mechanism would fund Water Centres of Excellence at institutions such as the University of Khartoum and the Sudan University of Science and Technology, linking applied research, training, and field deployment. By embedding scientific expertise within recovery infrastructure, the model seeks to reverse brain drain and rebuild national competence in water safety governance.

Updating National Water Standards

A second governance priority concerns regulatory standards. The Sudanese Standards and Metrology Organisation (SSMO) currently lacks binding thresholds for cyanotoxins in drinking water. Internationally, the World Health Organization recommends a provisional guideline value of $1.0 \mu\text{g L}^{-1}$ for total microcystin-LR in potable water (WHO, 2024). Aligning national standards with WHO guidelines would serve multiple purposes. First, it would establish a legally enforceable definition of biological safety. Second, it would create a regulatory signal capable of catalysing donor investment in advanced treatment technologies such as granular activated carbon (GAC). Finally, it would integrate biological risk explicitly into national water policy, closing a long-standing conceptual gap between quantity and quality.

Implementation Strategy

Translating the Smart Village Water-Security Module from pilot concept to national recovery infrastructure requires a phased and adaptive implementation strategy. Given Sudan's post-conflict constraints, sequencing is essential to balance scientific rigour, community ownership, and institutional rebuilding.

National Cyanotoxin Survey (SNCS)

Before large-scale deployment, Sudan requires a national baseline assessment of biological water risk. The chapter therefore proposes the establishment of a *Sudan National Cyanotoxin Survey (SNCS)* as a twelve-month pilot programme targeting twenty high-risk *haffirs* in North Kordofan and West Darfur.

This phase would combine satellite remote sensing with ground-based monitoring. Sentinel-2 imagery enables the detection of phycocyanin signatures associated with cyanobacterial biomass, providing spatial and temporal patterns of bloom formation (Simis et al., 2005; Simis et al., 2007). These satellite observations would be cross-referenced with data from IoT sensors deployed at *haffir* level, allowing validation under Sudanese environmental conditions. The SNCS would serve three critical functions: establishing empirical evidence of cyanotoxin risk, prioritising intervention zones, and building national technical capacity in biological water surveillance.

Community Water Literacy

Technology alone cannot guarantee biological security. Sustainable operation of the Smart *Haffir* depends on local knowledge, skills, and institutional ownership. Each SVN installation is therefore paired with a structured *Water Literacy Programme*. This programme trains local youth as “Cyber-Stewards” or community-based citizen scientists capable of maintaining LoRaWAN nodes, interpreting sensor dashboards, and responding to early-warning alerts. Beyond safeguarding water quality, this approach generates new forms of rural employment and technical identity, providing incentives for young people to remain within their communities rather than migrating to urban centres or conflict economies. Capacity building thus functions simultaneously as a water-security intervention and a livelihood strategy aligned with broader recovery objectives.

Integration with the Livestock Economy

Livestock production remains the backbone of Sudan's rural economy and a pillar of national sovereignty. Biological water insecurity poses a direct threat to this sector, as cyanotoxin exposure can trigger sudden and catastrophic livestock mortality. The SVN model integrates Smart *Haffirs* with veterinary and pastoralist services. Automated water troughs positioned at *haffir* margins can be remotely shut off when toxic conditions are detected, preventing animal exposure during bloom events. This safeguard protects pastoral households from devastating economic loss and reinforces trust in local water governance.

From Traditional *Haffirs* to Smart *Haffirs*

To clarify the transformative contribution of the Smart Village Network, it is useful to contrast conventional *haffir* management with the SVN approach across key governance and technical dimensions. This comparison illustrates how design choices embed either vulnerability or resilience into water infrastructure.

Risk Management

Traditional *haffir* management focuses almost exclusively on *volumetric availability*. Success is measured by whether water is present, not whether it is biologically safe. Monitoring, where it exists, relies on periodic manual sampling and visual inspection, both of which are incapable of detecting dissolved cyanotoxins or anticipating bloom dynamics (WHO, 2008).

By contrast, the SVN adopts a *toxicological risk* framework that prioritises biological safety alongside quantity. Continuous IoT-based monitoring and satellite surveillance enable early detection of hazardous conditions, shifting management from reactive response to preventive control (Simis et al., 2007).

Response Logic and Engineering Design

Under traditional systems, intervention typically occurs only after illness, livestock deaths, or visible water deterioration have already taken place. Engineering design emphasises excavation volume with little attention to runoff control, stagnation, or ecological balance. Governance remains centralised, with rural communities dependent on distant laboratories and ministries for decisions and remediation.

The SVN reverses this logic. Vegetated buffer zones, solar-powered aeration, and real-time sensing are embedded at the design stage, transforming the *haffir* into a biologically managed system. Responses are local, immediate, and informed by data accessible at village level. Governance is decentralised and community-owned, supported—but not controlled—by national institutions.

Capacity and Knowledge Ownership

In conventional models, technical capacity resides primarily in Khartoum-based institutions. Rural communities are positioned as passive recipients of risk and aid. The SVN model redistributes capacity through training, data sovereignty, and locally governed decision-making. Knowledge becomes a protective asset held by the community rather than an extractive resource monopolised by the centre. This shift is central to the SVN's social-justice orientation: safety is not granted from above but produced and maintained from within.

Conclusion: Securing the Biological Foundation of Dignity

Water security represents the invisible threshold between a life of dignity and a condition of disposable vulnerability. In Sudan's marginalised rural regions, the presence of water alone has too often been mistaken for safety, masking chronic

exposure to biological hazards embedded in neglected infrastructure. This chapter has argued that post-conflict recovery demands a fundamental redefinition of water security—one that explicitly integrates biological safety, social justice, and local governance.

By addressing the *Invisible Threshold* of cyanotoxicity, the Smart Village Network reframes the *haffir* from a passive storage basin into an active, resilient public-health asset. Through the integration of nature-based engineering, renewable energy, and real-time digital sensing, the Smart *Haffir* model demonstrates how decentralised infrastructure can deliver protection, trust, and stability at village level. In doing so, it transforms water from a source of risk into a foundation for peace, livelihoods, and institutional renewal.

Crucially, the SVN approach does not displace indigenous systems; it modernises them in situ. The *haffir* remains culturally familiar and socially embedded yet technologically upgraded to meet contemporary environmental and biological threats. This hybridisation ensures that recovery infrastructure is not only technically effective but socially legitimate.

In the broader architecture of Sudan's national recovery, biologically secure water systems constitute a form of *foundational infrastructure*. Without them, investments in agriculture, livestock, health, and education remain precarious. With them, communities gain the confidence necessary to plan, settle, and cooperate over the long term. Water security, in this sense, becomes an enabling condition for citizenship itself.

Policy Recommendations

Drawing on the analysis presented, the following policy recommendations are proposed:

1. *Mandate Smart Design*
All new and rehabilitated water-harvesting structures should incorporate biological buffer zones, aeration, and monitoring as standard design requirements.
2. *Fund the Sudan National Cyanotoxin Survey (SNCS)*
Establish a national baseline for biological water risk through coordinated satellite and ground-based monitoring.
3. *Invest in Local IoT Infrastructure*
Prioritise low-power, solar-based sensor networks over exclusive reliance on centralised laboratory expansion.
4. *Establish a National Water Quality Commission (NWQC)*
Create an institutional bridge between irrigation, health, and environmental authorities to govern biological water security.
5. *Align National Standards with WHO Guidelines*
Legally adopt international thresholds for cyanotoxins to enable regulatory enforcement and donor alignment.

6. *Integrate Water Security into Peacebuilding Frameworks*
Recognise biologically safe water infrastructure as a core component of conflict prevention and social stabilisation.

ANNEX A

Technical Specifications for the Smart Haffir System Integrating Floating Photovoltaics (FPV) for Water Harvesting haffirs in Rural Arid Sudan

1. Statement of Purpose: The “Smart Haffir” Initiative

The Smart Haffir initiative transforms traditional rainwater harvesting basins in Sudan’s Darfur and Kordofan regions from passive, stagnant reservoirs into active, technology-driven assets. By integrating Floating Photovoltaics (FPV) and Artificial Intelligence of Things (AIoT) sensors, the project addresses the “Triple Threat” of Sudanese water management:

- **Extreme Evaporation:** Losses of up to 50% of stored volume.
- **Biological Degradation:** Proliferation of toxigenic cyanobacteria.
- **Salinity Spikes:** Rising mineral concentrations that threaten livestock health.

2. The Hydro-Biological Challenge

In the semi-arid climate of Sudan, the first heavy rains trigger a “flush-off” effect, depositing nitrogenrich agricultural runoff and animal waste into *haffirs*. Combined with intense solar radiation, these stagnant bodies act as unintended “bioreactors” for harmful algal blooms. As water levels recede through evaporation, the concentration of Total Dissolved Solids (TDS) rises, leading to high salinity that causes kidney failure and dehydration in cattle and camels.

Technical Intervention: Floating Photovoltaics (FPV)

Deploying a modular FPV array over the *haffir* surface serves three critical functions:

- **Biological Control:** By blocking the Photosynthetically Active Radiation (PAR) spectrum, FPV reduces algal biomass by 60–80%. The system also powers ultrasonic transducers that disrupt the buoyancy vacuoles of cyanobacteria, neutralising them without chemical additives.
- **Evaporation Mitigation:** A 50% surface coverage (approx. 2,800 m²) on a standard *haffir* can save roughly 8,500 m³ of water annually. This volume is sufficient to sustain 500 cattle or 2,000 sheep through the peak 8-month dry season.
- **Salinity Stabilization:** By reducing evaporation rates, the FPV system maintains stable Electrical Conductivity (EC) levels, preserving potable water quality for livestock and human consumption.

3. Smart Village Network (SVN) & Infrastructure

The FPV array acts as an off-grid “Power Plant,” supporting a suite of Conjunctive Quality Management tools:

- **AIoT Sensing:** Real-time monitoring of pH, dissolved oxygen (DO), turbidity, and water levels.
- **LoRaWAN Connectivity:** A low-power gateway transmits data up to 15 km to village hubs, bypassing the need for distant laboratory analysis.
- **Community Utility:** Surplus energy provides a “Solar Water Hub” for mobile device charging and LED lighting for safe nighttime water collection.
- **Security and Maintenance:** Power supports CCTV and remote monitoring to protect assets in conflict-prone areas. Automated “tilt” mechanisms or cleaning robots mitigate the efficiency losses (up to 40%) caused by *Habooob* dust storms.

4. Engineering Configuration and Livestock Protection

To balance energy yield with ecological health, a 40–60% surface coverage is recommended.

- **Layout:** The FPV array is tethered centrally via a submerged mooring system. A 5-metre “drinking perimeter” is maintained to allow livestock access without damaging pontoons.
- **Durability:** Units utilise UV-stabilised, High-Density Polyethylene (HDPE) with ventilation gaps to prevent heat transfer to the water column during extreme summer temperatures.

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CHAPTER 12

ENERGY TRANSITION AND PEACEBUILDING FOR NATIONAL RECONSTRUCTION IN SUDAN

Adil Haseeb

The global energy system is undergoing a structural transition toward renewable energy sources, driven by climate change mitigation, energy security, and sustainable development imperatives (IEA, 2023; IPCC, 2022). Beyond its environmental and economic dimensions, a growing body of research emphasises the potential of renewable energy deployment to contribute to conflict reduction and peacebuilding, particularly in fragile and conflict-affected contexts (Bazilian et al., 2011; Sovacool & Walter, 2019). By decentralising energy production and improving access to basic services, renewable energy systems can reduce dependence on contested resources and mitigate structural drivers of violence.

In Sudan, extensive solar energy potential represents a critical enabling factor for addressing violent competition over scarce resources and for mitigating the underlying conditions that have facilitated recurring conflict. Sudan's protracted crises are rooted in persistent structural inequalities, including unequal access to land and natural resources, inadequate public services, and weak governance institutions (Johnson, 2016; de Waal, 2015). These conditions have contributed to social exclusion, racialised narratives, and the proliferation of armed militias characterised by weak command structures and limited accountability (Mamdani, 2009; Small Arms Survey, 2020).

Sudan's exceptionally high solar irradiation, coupled with substantial groundwater and surface-water resources, offers a viable pathway for post-conflict reconstruction and durable peacebuilding (FAO, 2018; World Bank, 2021). Improved access to reliable energy supports livelihoods, enhances service delivery, and strengthens local economies, thereby reducing incentives for participation in armed violence (Brunnschweiler & Bulte, 2009; UNDP, 2021). This chapter argues that integrating solar energy deployment into peacebuilding and national recovery strategies can support institutional rebuilding, social cohesion, and sustainable development. It proposes practical sectoral applications and governance arrangements aligned with the Sudan National Recovery and Reconstruction Framework (SNRF) and the Smart Village Network (SVN).

Energy Transformation in Fragile Contexts

The global energy landscape is undergoing a profound shift as states and institutions accelerate the transition from fossil fuels to renewable energy. Driven

by climate mitigation, energy security, and sustainable development objectives, this transition is now embedded in national strategies and international agreements (IEA, 2024; UNFCCC, 2015). Increasingly, its implications for fragile and conflict-affected states have become central to policy debates. Energy access, or its absence, shapes economic opportunity, social inclusion, and state–society relations. Chronic energy poverty functions both as a symptom and a driver of fragility, undermining service provision, reinforcing underdevelopment, and amplifying grievances that armed actors can exploit (Collier & Hoeffler, 2004; Middleton et al., 2022).

Decentralised renewable energy, particularly solar, offers new avenues for addressing these structural drivers of conflict. Such systems can be deployed rapidly and independently of national grids, making them potential tools for conflict prevention and peacebuilding (Energy Peace Partners, 2023). Sudan provides a compelling case. The country faces one of the most severe political and humanitarian crises in its modern history, marked by widespread violence, mass displacement, and the collapse of basic state functions (OCHA, 2025). These acute crises are rooted in longstanding patterns of underdevelopment, environmental degradation, and governance failure (de Waal, 2019; Pantuliano et al., 2009).

At the same time, Sudan possesses exceptional renewable energy resources, especially solar irradiation across nearly its entire territory. Combined with declining technology costs and increasing modularity, this endowment creates a strategic opportunity to integrate energy provision into a broader peacebuilding and reconstruction agenda (IRENA, 2023). This chapter advances three core arguments: first, that energy systems in fragile states function as political and social institutions shaping conflict dynamics (Bridge et al., 2013); second, that decentralised solar technologies possess characteristics aligned with peacebuilding objectives under conditions of state fragility (UNDP, 2020); and third, that Sudan’s renewable-resource endowments, if governed inclusively and deployed strategically, can help address the structural conditions sustaining violent conflict (Acemoglu & Robinson, 2012).

State Failure, Civil War, and the Imperative of Peace

The armed conflict that erupted in Sudan in April 2023 exemplifies a transition from protracted civil war to advanced state failure (CFR, 2025). Violence has spread across much of the country, eroding state capacity, institutional coherence, and social order. Fatalities are estimated in the tens of thousands, with broader assessments suggesting that total deaths—including indirect mortality from hunger, disease, and health-system collapse—may exceed one hundred thousand (AP News, 2024; Al-Monitor, 2024; Lancet Global Health, 2025). More than twelve million people have been displaced internally or across borders, reflecting the collapse of the state’s core function of civilian protection (IOM, 2025; UNHCR, 2025).

Rival combatants have deployed heavy weaponry in densely populated urban areas, while health facilities, schools, and critical infrastructure have been systematically destroyed or rendered non-functional (WHO, 2024; UNICEF, 2025). Economic output has collapsed, food insecurity has reached catastrophic levels, and violence has become self-sustaining through predation and deprivation (IMF, 2024; IPC, 2024). In this context, no developmental or environmental strategy can take root while the machinery of war continues to operate. Ending the conflict is therefore not only a political necessity but a humanitarian and moral imperative (Paris & Sisk, 2009).

Peace in Sudan requires more than a ceasefire. It demands disarmament, the dissolution of militias, the reconstitution of unified professional security institutions, and the rebuilding of state legitimacy through tangible peace dividends (Brinkerhoff, 2005; Barnett et al., 2007). The energy transition is inseparable from the peace transition. Sudan cannot rebuild without disarmament, and disarmament cannot succeed unless former combatants and affected communities see viable, dignified alternatives to violence (Collier, 2007).

Renewable Energy, Conflict, and Peacebuilding: Conceptual Foundations

Peacebuilding seeks to address structural violence embedded in social, economic, and political systems that systematically disadvantage particular groups (Galtung, 1969). Energy systems intersect directly with these structures. Centralised energy infrastructures often mirror broader patterns of political marginalisation, while energy poverty constrains livelihoods, undermines state legitimacy, and fuels grievance formation (Barnett et al., 2007; UNDP, 2022).

Energy and Conflict Dynamics

Traditional analyses of energy and conflict have focused on competition over oil, gas, and other high-value natural resources. The “resource curse” literature links natural-resource abundance to heightened risks of conflict, authoritarianism, and institutional decay (Auty, 1993; Sachs & Warner, 1995). Conflict arises not from absolute scarcity but from unequal access, exclusionary governance, and the politicisation of resource allocation (Humphreys, 2005).

In fragile states, centralised energy systems frequently concentrate investment in capital cities and politically favored regions, while peripheral areas remain underserved (UNDP, 2022). These spatial inequalities reinforce perceptions of neglect and injustice, contributing to grievance formation and social fragmentation (Stewart, 2008). Energy poverty further intersects with conflict dynamics by limiting economic opportunity and weakening state–society relations (IEA, 2023).

In conflict-affected contexts, communities often rely on insecure or environmentally destructive coping mechanisms, such as diesel generators or charcoal production, intensifying competition over natural resources and

creating entry points for armed actors (Sovacool, 2018). Energy infrastructure is also a frequent target during hostilities, producing cascading failures that disproportionately affect civilians (Balcetis et al., 2021). Rebuilding pre-conflict energy systems without addressing governance and access risks reproducing the very conditions that contributed to instability (Middleton et al., 2022).

Renewable Energy and Peacebuilding Pathways

Decentralised renewable energy—especially solar—has attracted growing attention within peacebuilding and development policy (Energy Peace Partners, 2023). Such systems can be deployed incrementally, scaled to local needs, and operated independently of national grids, making them particularly suitable for fragile contexts with limited institutional capacity and volatile security environments (IRENA, 2022).

Renewable-energy interventions can reduce structural violence by expanding equitable access to services and economic opportunities in marginalised regions (UNDP, 2023). Solar-powered water systems, clinics, schools, and agricultural infrastructure improve daily living conditions while signaling tangible peace dividends (OECD, 2012).

Energy access can also function as an inclusive, identity-neutral public good. Unlike land or minerals, which are embedded in ethnic or regional claims, energy provision can be framed as a shared developmental objective, creating opportunities for cooperation across social divides (Barnett, 2000). However, peacebuilding outcomes are not automatic. Poorly designed interventions may exacerbate inequalities or enable elite capture, underscoring the decisive role of governance and institutional design (Berdal & Zaum, 2013).

Analytical Framework

This chapter adopts an integrated analytical framework linking renewable-energy deployment to peacebuilding outcomes through three pathways:

1. **Livelihoods and economic opportunity:** Renewable energy can support agriculture, small enterprises, and value-added processing, reducing incentives for participation in armed violence (Collier, 2007).
2. **Service delivery and state legitimacy:** Energy-enabled services—health, water, education, communications—strengthen state–society relations and demonstrate peace dividends (World Bank, 2021).
3. **Governance and social cohesion:** Inclusive and transparent governance of energy systems promotes equity and social cohesion, while exclusionary control can exacerbate conflict (Acemoglu & Robinson, 2012).

These pathways correspond directly to the core pillars of the Sudan National Recovery and Reconstruction Framework (SNRF) and provide the analytical basis for operational integration with the Smart Village Network (SVN).

Sudan's Conflict Landscape and Structural Drivers

Sudan's contemporary crisis must be understood within a long history of structural inequality, contested resource politics, and state fragility (Johnson, 2016; de Waal, 2015). Since independence, political power and economic investment have been concentrated in the center, while peripheral regions have been systematically marginalised. Persistent disparities in access to land, water, and livelihoods have intersected with ethnic and regional identities, escalating grievances into violence (Flint & de Waal, 2008; Ahmed, 2009).

Militarisation and fragmented security governance have deepened civilian vulnerability. Armed groups have mobilised around resource control—particularly in gold-producing regions—while weak accountability has produced widespread atrocities and displacement (Global Witness, 2019; Patey, 2021). Energy poverty is a critical but often overlooked dimension of this fragility. Decades of underinvestment have left rural and peripheral areas without reliable electricity, undermining agriculture, health, education, and local economies (IEA, 2019; World Bank, 2020).

Environmental stressors, including drought and desertification, intersect with energy scarcity to intensify competition between pastoralists and farmers, contributing to displacement and local conflict (Ayoub, 1999; UNEP, 2018). These dynamics underscore the need for decentralised and conflict-sensitive energy solutions capable of addressing structural drivers of violence rather than merely alleviating symptoms.

Renewable Resource Endowments and Strategic Potential

Sudan's natural endowments provide a material foundation for structural transformation in a post-conflict context. Average solar irradiation of approximately 5.5–7.0 kWh/m²/day places Sudan among the most solar-rich countries globally (IRENA, 2022; World Bank, 2020). The modularity, declining cost, and relative resilience of solar technologies make them particularly suitable for fragile and conflict-affected settings where centralised grid infrastructure has been degraded or destroyed (Bazilian & Pielke, 2013; Lahn & Grafham, 2015).

Solar-powered water systems represent a critical entry point linking energy access to livelihoods and conflict mitigation. Sudan possesses substantial groundwater reserves and seasonal surface-water resources, but limited energy access has constrained pumping, irrigation, and drinking-water provision (FAO, 2018; UNEP, 2018). Solar energy can strengthen the energy–water–food nexus by enabling irrigation, supporting climate-resilient agriculture, and reducing labor burdens—particularly for women (Burney et al., 2010; World Bank, 2020).

Renewable energy deployment also contributes to environmental sustainability and climate resilience. Reduced reliance on biomass fuels can mitigate deforestation and land degradation, while solar-powered water and agricultural systems enhance adaptive capacity in the face of increasing climate

variability (IPCC, 2022; Osman-Elasha, 2008). Integrating renewable energy into reconstruction strategies therefore offers a pathway that is simultaneously low-carbon, climate-adaptive, and peace-enhancing (Verhoeven, 2015).

Solar energy can contribute to peacebuilding in Sudan through mutually reinforcing pathways aligned with the Sudan National Recovery and Reconstruction Framework (SNRF). These pathways link energy access directly to livelihoods, service delivery, governance, and social cohesion (Barnett et al., 2007; World Bank, 2020).

Livelihoods and Economic Recovery

Livelihood insecurity remains a central driver of conflict in Sudan, particularly among youth, internally displaced persons, and conflict-affected rural populations (de Waal, 2015; Young, 2021). Peacebuilding research consistently shows that the absence of viable economic opportunities increases susceptibility to recruitment by armed groups, while employment and income generation reduce incentives for violence (Collier et al., 2003; Humphreys & Weinstein, 2008).

Solar energy can revitalise rural economies by enabling irrigation, agro-processing, cold storage, and small-scale manufacturing (Burney et al., 2010; IRENA, 2022). These activities expand legitimate income opportunities, stabilise food production, and reduce reliance on illicit or conflict-linked livelihoods (UNDP, 2018). By anchoring economic recovery at the community level, decentralised solar systems help shift incentives away from armed mobilisation toward productive engagement.

The restoration of basic services is a cornerstone of peacebuilding and the reconstitution of state legitimacy (Paris & Sisk, 2009; Brinkerhoff, 2005). Energy access is a prerequisite for effective health care, education, water supply, and communications, yet remains severely limited in many parts of Sudan (IEA, 2019; World Bank, 2020). Solar-powered clinics, schools, water systems, and telecommunications infrastructure can rapidly restore essential services in conflict-affected and remote areas (ESMAP, 2019). Improved service delivery provides visible peace dividends, strengthens trust between citizens and institutions, and signals a tangible commitment to recovery and inclusion (Barnett et al., 2007; OECD, 2012).

Decentralisation is a recurrent theme in peacebuilding and energy policy, particularly in addressing horizontal inequalities and promoting inclusive development (Stewart, 2008; Lahn & Grafham, 2015). In Sudan, centralised governance structures have historically marginalised peripheral regions, reinforcing grievances and undermining national cohesion (Mamdani, 2009; de Waal, 2015).

Decentralised solar systems offer a mechanism for redistributing development benefits more equitably by delivering energy directly to communities (IRENA, 2022). Community-owned or cooperative energy models can foster

social cohesion and collective action when supported by inclusive governance arrangements and minimal but robust national oversight (Yadoo & Cruickshank, 2012; Bhattacharyya, 2013). However, peacebuilding outcomes depend critically on institutional design; without safeguards, decentralised systems may be captured by elites or armed actors (Berdal & Zaum, 2013).

Sectoral Applications for Peaceful Development

Operationalising solar-driven peacebuilding in Sudan requires sector-specific strategies that generate livelihoods, reduce competition over scarce resources, and strengthen local institutions. The following applications illustrate how renewable energy can be integrated into key sectors in conflict-sensitive and peace-enhancing ways (Barnett et al., 2007; OECD, 2012).

Agriculture remains the backbone of Sudan's rural economy, yet productivity is constrained by unreliable energy, water scarcity, and climate stress (Ayoub, 1999; FAO, 2018). Solar-powered irrigation systems—including drip and shallow groundwater pumping—can stabilise yields, reduce dependence on rain-fed agriculture, and mitigate conflict over seasonal water points (Burney et al., 2010; UNEP, 2018).

Solar cold-storage facilities and processing units can reduce post-harvest losses and enable farmers to access higher-value markets, strengthening food security and rural incomes (World Bank, 2020). Community-managed solar water yards serving both pastoralists and farmers can support negotiated resource-sharing arrangements and reduce localised violence (Young & Osman, 2006; Mkutu, 2019).

Conflict and fuel shortages have weakened Sudan's industrial base, particularly in peripheral regions. Solar energy enables decentralised, small-scale manufacturing and value-added processing independent of the national grid (Bhattacharyya, 2013). Applications include solar-powered milling, oil pressing, refrigeration, carpentry, and metalwork. By supporting rural and peri-urban value chains, these systems create employment, reduce urban migration pressures, and strengthen local economies historically excluded from development (UNDP, 2018; IRENA, 2022).

Mining—especially gold—has become a major driver of conflict financing in Sudan (Global Witness, 2019; Patey, 2021). Renewable energy can help shift the sector toward safer, more transparent, and civilian-controlled practices. Solar-powered water pumping, ore crushing, and lighting systems reduce operational costs and environmental harm while limiting reliance on diesel supply chains often controlled by armed actors (ILO, 2019). Community-owned solar mini-grids around mining areas can reduce the economic leverage of militias and improve oversight, contributing to demilitarisation and improved governance of extractive resources (Le Billon, 2005).

Reliable electricity is essential for education, health care, and public administration. Solar-powered schools and clinics can restore learning

environments, enable digital connectivity, and support basic medical services in conflict-affected areas (ESMAP, 2019; WHO, 2024). Solar energy also enables water purification, cold chains for vaccines, and communications infrastructure, strengthening resilience and improving service delivery outcomes (UNICEF, 2025; World Bank, 2021). These interventions provide visible peace dividends and reinforce state legitimacy at the local level (Paris & Sisk, 2009).

Comparative Insights from Fragile and Post-Conflict Contexts

Comparative experience from other fragile and post-conflict settings provides important lessons for leveraging renewable energy as a peacebuilding tool. Evidence from Rwanda, Somalia, Afghanistan, and Northern Kenya highlights both the potential and the risks of decentralised energy deployment in contexts of weak governance and social fragmentation (Barnett et al., 2007; OECD, 2012).

Rwanda's post-genocide reconstruction illustrates how decentralised energy solutions can support recovery when embedded within a coherent national development framework. Following 1994, the Rwandan government prioritised off-grid and mini-grid solar systems to expand rural energy access, linking electricity provision to health services, education, and local economic transformation (Abbott et al., 2017; World Bank, 2018). From a peacebuilding perspective, energy infrastructure functioned as a tangible peace dividend, reinforcing state legitimacy and social stability (Chemouni, 2014). However, Rwanda's experience also reflects conditions of strong central coordination and political stability that differ markedly from Sudan's current context (Ansoms & Rostagno, 2012).

Somalia and Somaliland offer contrasting lessons. In the absence of a functional central state, decentralised private-sector solar initiatives emerged as primary electricity providers (Hansen, 2019). While these systems demonstrated resilience under extreme fragility, weak regulation resulted in high costs and uneven access, reinforcing regional and social inequalities (Hassan & Mahmoud, 2019; Bryld et al., 2017). Somalia underscores the necessity of minimal governance frameworks to prevent energy markets from reproducing exclusion and conflict (Menkhaus, 2014).

Afghanistan provides a cautionary example. Donor-funded solar and micro-hydro projects improved electricity access and livelihoods in some areas, but their peacebuilding impact was often undermined by poor coordination, elite capture, and insufficient attention to local conflict dynamics (Fishstein & Wilder, 2012; Jackson, 2015). Evaluations show that infrastructure interventions lacking conflict-sensitive design can exacerbate tensions rather than mitigate them (Goodhand, 2013).

Northern Kenya offers particularly relevant insights for Sudan's pastoralist regions. Solar-powered water systems and mini-grids have been deployed to support livestock, irrigation, and rural services in conflict-prone areas. Where

governance arrangements aligned with customary resource-sharing institutions, solar energy contributed to reduced violence and improved inter-communal cooperation (Mkutu, 2019; Greiner, 2013). Conversely, exclusionary designs intensified disputes, underscoring the importance of local institutional alignment (Boege et al., 2009).

Lessons for Sudan

Comparative evidence yields several lessons directly applicable to Sudan:

- Equity through governance: Renewable energy supports peacebuilding only when embedded in inclusive and accountable governance structures (World Bank, 2018; Menkhaus, 2014).
- Conflict sensitivity: Energy interventions must align with local conflict dynamics and resource-sharing institutions, particularly in pastoralist regions (Mkutu, 2019; Greiner, 2013).
- Limits of decentralisation: Decentralisation alone is insufficient; without safeguards, it may reproduce or intensify inequalities (Stewart, 2008).
- Integrated design: Peacebuilding outcomes are strongest when energy access simultaneously supports livelihoods, health, water, and education (Barnett et al., 2007; OECD, 2012).

Governance and Conflict-Sensitive Energy Design

The peacebuilding potential of solar energy in Sudan depends fundamentally on governance arrangements and institutional design. Energy systems are not neutral technologies; they are socio-political institutions that shape access, authority, and legitimacy (Barnett et al., 2007; Lahn & Grafham, 2015). In fragile and conflict-affected contexts, poorly governed energy interventions risk reinforcing exclusion, militarisation, and elite capture rather than mitigating conflict (Berdal & Zaum, 2013).

Renewable energy deployment in Sudan is embedded within a complex political economy characterised by fragmented authority, weak institutions, and contested legitimacy (de Waal, 2015; Menkhaus, 2014). These conditions create significant risks that armed actors or politically connected elites may seek to control energy assets, extract rents, or manipulate access to consolidate power—patterns well documented in peacebuilding literature (Le Billon, 2005; *Journal of Peace Research*, 2010).

Energy infrastructure may also become a strategic target during conflict. Although solar systems are more dispersed than centralised grids, they remain vulnerable to theft, sabotage, or appropriation in insecure environments (Lahn & Grafham, 2015). Without effective governance and protection mechanisms, renewable energy assets may exacerbate local tensions rather than alleviate them (UNEP, 2018).

Donor-driven energy projects also carry institutional risks. While bypassing state institutions may be necessary during humanitarian emergencies, peacebuilding research warns that sustained parallel systems can undermine long-term state capacity and legitimacy (Paris & Sisk, 2009; Brinkerhoff, 2005). In Sudan's case, balancing rapid service delivery with institution-building is therefore a central governance challenge. Comparative experience suggests that community-centered governance models offer promising pathways for aligning renewable energy deployment with peacebuilding objectives (Yadoo & Cruickshank, 2012; Bhattacharyya, 2013). Community energy cooperatives, local energy committees, and hybrid arrangements involving customary authorities and local governments can reduce exclusion and foster shared ownership of energy assets (Boege et al., 2009).

In Sudan, such models must be carefully adapted to local social structures and conflict dynamics. Customary institutions—such as tribal councils, water-user associations, and pastoralist committees—play a significant role in resource governance and can be leveraged to manage energy assets inclusively (Young & Osman, 2006). Safeguards are necessary, however, to ensure that community governance does not reinforce gender, generational, or ethnic exclusion (Stewart, 2008).

Community-level governance should be complemented by minimal but robust national regulatory frameworks to ensure technical standards, affordability, and long-term sustainability (IRENA, 2022). This hybrid approach—combining local ownership with national oversight—aligns with emerging best practices in fragile-state energy governance (Lahn & Grafham, 2015).

Conflict-sensitive design is essential to prevent renewable energy interventions from inadvertently exacerbating tensions. Peacebuilding literature emphasises the importance of conflict analysis, stakeholder mapping, and risk assessment prior to project implementation (OECD, 2012; Conflict, Security & Development, 2017). Key safeguards for Sudan include:

- Inclusive beneficiary selection across ethnic, gender, and livelihood groups (Stewart, 2008)
- Transparent decision-making, pricing, and management mechanisms (Brinkerhoff, 2005)
- Monitoring and evaluation frameworks tracking both technical performance and peacebuilding outcomes (OECD, 2012)
- Flexibility to adapt projects to evolving security and political conditions (Goodhand, 2013)

Energy projects should be embedded within broader peacebuilding and development strategies, linking energy access to livelihoods, service delivery, and local reconciliation processes (Barnett et al., 2007). International partners

have a critical role in supporting conflict-sensitive approaches while avoiding the imposition of externally driven models (Paris & Sisk, 2009).

Financing Sudan's Solar Peacebuilding Transition

Financing represents a major constraint to leveraging solar energy as a catalyst for peacebuilding and post-conflict reconstruction in Sudan. Fragile and conflict-affected states face elevated investment risks, weak institutional capacity, and limited domestic fiscal space, all of which deter private investment and complicate donor engagement (Collier, 2007; World Bank, 2020). Mobilising finance for renewable energy in such contexts therefore requires innovative instruments that combine concessional funding, risk mitigation, and institutional support (Energy Policy, 2015; OECD, 2020).

Multilateral development banks and international financial institutions play a central role in enabling renewable energy deployment in fragile states. Institutions such as the World Bank, African Development Bank, and Islamic Development Bank have increasingly integrated renewable energy and fragility considerations into their operational frameworks (World Bank, 2020; AfDB, 2019). Concessional loans, grants, and blended finance facilities can lower the cost of capital and absorb risks that private investors are unwilling to bear (OECD, 2020).

Climate finance mechanisms offer additional opportunities. Instruments such as the Green Climate Fund (GCF), Global Environment Facility (GEF), and Adaptation Fund are designed to support low-carbon and climate-resilient development, with growing recognition of the need to prioritise fragile and conflict-affected contexts (UNFCCC, 2021; Schalatek & Bird, 2020). Solar energy projects in Sudan align closely with these objectives by delivering mitigation benefits while enhancing adaptive capacity through improved water management, agriculture, and service delivery (IRENA, 2022).

Blended finance approaches—combining public, philanthropic, and private capital—have shown promise in de-risking investments and leveraging limited public resources (OECD, 2020). Guarantees, first-loss capital, and political risk insurance can help crowd in private actors while maintaining public oversight (MIGA, 2019). However, peacebuilding research cautions that financing models must avoid reinforcing elite capture or exacerbating inequalities, underscoring the importance of transparency and inclusive governance (Berdal & Zaum, 2013; Paris & Sisk, 2009).

Beyond formal financial institutions, bilateral donors, UN agencies, and international NGOs play a critical role in mobilising resources and technical expertise for energy-based peacebuilding (UNDP, 2018; UNOPS, 2020). In humanitarian and early recovery phases, grant-based financing is often essential to rapidly restore energy access for health facilities, water systems, and displaced populations (IOM, 2021).

The Sudanese diaspora represents a significant but underutilised source of finance and social capital. Remittances have historically rivaled or exceeded

official development assistance in some years, while diaspora networks possess contextual knowledge and trust-based relationships that can support community-level energy initiatives (World Bank, 2019). Innovative mechanisms such as diaspora bonds, revolving community energy funds, and cooperative investment schemes could be adapted to Sudan's context (Ketkar & Ratha, 2010).

Effective coordination among international actors is essential to prevent fragmentation and duplication. Peacebuilding research consistently highlights that uncoordinated donor interventions can undermine institutional coherence and sustainability (Paris & Sisk, 2009; OECD, 2012). Aligning energy financing with national recovery frameworks and locally driven priorities is therefore critical to maximising peacebuilding impact.

Policy and Strategic Recommendations

Drawing on the preceding analysis, this section outlines policy and strategic recommendations for leveraging solar energy as a peacebuilding and reconstruction instrument in Sudan. These recommendations are grounded in peacebuilding theory, energy-policy best practices, and comparative evidence from fragile and conflict-affected contexts (Barnett et al., 2007; Lahn & Grafham, 2015).

Integrating Energy into Peacebuilding and Recovery Frameworks

Energy policy should be explicitly integrated into Sudan's peacebuilding and post-conflict recovery strategies. Rather than treating energy as a standalone technical sector, policymakers and international partners should recognise energy access as a cross-cutting enabler of livelihoods, service delivery, and governance legitimacy (World Bank, 2020; UNDP, 2018). Peace agreements, recovery plans, and stabilisation frameworks should include provisions for decentralised renewable energy deployment in conflict-affected and marginalised regions (Paris & Sisk, 2009; OECD, 2012).

Prioritizing Decentralised and Community-Based Solar Systems

Given the scale of infrastructural destruction and governance constraints, decentralised solar systems should be prioritized over centralised grid reconstruction in the short to medium term (IRENA, 2022; ESMAP, 2019). Community-based and cooperative models can enhance local ownership, reduce exclusion, and support social cohesion when designed with inclusive governance mechanisms (Yadoo & Cruickshank, 2012; Bhattacharyya, 2013). National energy policy should establish enabling regulatory frameworks that support such models while ensuring technical standards, affordability, and sustainability (Energy Policy, 2015).

Strengthening Institutions and Conflict-Sensitive Governance

Institutional capacity building is very essential to ensure that renewable energy interventions contribute to peace rather than exacerbate tensions (Brinkerhoff,

2005; Stewart, 2008). This includes strengthening local governance structures, enhancing transparency in project selection and financing, and embedding conflict-sensitive planning, monitoring, and evaluation tools into energy programs (OECD, 2012; Goodhand, 2013). International partners should invest in institutional development alongside infrastructure provision, consistent with peacebuilding best practices (Barnett et al., 2007; Paris & Sisk, 2009).

Leveraging Climate Finance and Blended Funding Mechanisms

Sudan should strategically position solar energy initiatives within global climate-finance frameworks, emphasising their dual mitigation and adaptation benefits (UNFCCC, 2021; Schalatek & Bird, 2020). Donors and policymakers should expand the use of blended finance instruments and risk-sharing mechanisms to mobilise private capital while safeguarding peacebuilding objectives (OECD, 2020). Transparency, accountability, and inclusive participation must remain central to financing arrangements to prevent elite capture and conflict reproduction (Berdal & Zaum, 2013).

Conclusion

Sudan's transition to renewable energy should be understood not merely as a technical or environmental shift, but as a peacebuilding intervention embedded within broader processes of national recovery and institutional reconstruction. Decentralised solar energy offers pathways to restore livelihoods, improve service delivery, and strengthen governance legitimacy—three core dimensions of sustainable peacebuilding in fragile states (Barnett et al., 2007; World Bank, 2020).

By addressing structural drivers of conflict—energy poverty, economic exclusion, and unequal access to services—solar energy can contribute to rebuilding trust between citizens and institutions and reducing incentives for violence. However, realising this potential requires inclusive governance, sustained financing, and conflict-sensitive design aligned with national recovery frameworks such as the Sudan National Recovery and Reconstruction Framework (SNRF).

Ultimately, renewable energy provides Sudan with more than electricity. It offers a strategic entry point for rebuilding the country from below, supporting durable peace, social cohesion, and long-term reconstruction. Whether this opportunity is realised will depend on political commitment, institutional integrity, and the collective capacity of Sudanese society and its international partners to align energy transition with the imperative of peace.

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CHAPTER 13

PESTICIDE POLLUTION IN SUDAN: CURRENT STATUS AND POST-WAR REMEDIATION

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The use of pesticides in Sudan began shortly after the Second World War; however, large-scale commercial application began in 1950 to control cotton jassid (*Jacobiasca lybica*) in the Gezira Scheme. During the initial phase, pesticide use was limited to a single spray per season. The first insecticide employed was dichloro-diphenyl-trichloroethane (DDT), a chlorinated hydrocarbon contact insecticide widely regarded at the time as both effective and economically viable (Bashir, 2004; Bashir, 2005a).

Over successive seasons, the frequency of DDT application increased, reaching approximately three sprays per season. This intensive use of a broad-spectrum insecticide disrupted agro-ecosystem balance and precipitated the emergence of secondary pests that had previously been of minor economic importance. These included cotton whitefly (*Bemisia tabaci*), thrips (*Thrips tabaci*), aphids (*Aphis gossypii*), and several species of bollworms. This phenomenon marked the beginning of a pesticide-dependent production system and represented a classic example of pesticide-induced pest resurgence (Hardin, 1968; Bashir, 2006).

In response to these emerging challenges, the Crop Protection Administration of the Gezira Scheme, acting on the scientific recommendations of the Agricultural Research Corporation (ARC), introduced insecticides belonging to the organophosphate (OP) group. These compounds included both contact and systemic formulations, such as dimethoate, which were considered more target-specific than earlier chlorinated hydrocarbons. Subsequently, carbamate insecticides—also comprising contact and systemic products—were introduced as alternatives and complements to OPs (Bashir, 2004; Abdelbagi, 2005).

During the 1970s, additional pesticide classes entered widespread use. Synthetic pyrethroids were adopted because of their high insecticidal potency and comparatively low application rates, while herbicides became increasingly important for weed control in both irrigated and rain-fed agricultural systems. At the same time, rodenticides and avicides from various chemical groups were routinely used to control rodents and migratory birds, particularly *Quelea quelea*, which posed significant threats to cereal production. These control operations were largely coordinated by the National Crop Protection Directorate (PPD) and the crop protection units of irrigated agricultural schemes on an annual basis.

In more recent decades, insecticides belonging to the neonicotinoid class and insect growth regulators (IGRs) have been introduced and widely used to control a broad spectrum of insect pests affecting both field and horticultural crops. These developments have significantly expanded both the diversity and volume of pesticides used in Sudanese agriculture, reinforcing chemical control as the dominant pest management strategy (Bashir, 2007; Bashir, 2013).

As a result, pesticides have remained in continuous and widespread use in Sudan for more than seven decades. At present, more than 100 companies operate in the pesticide sector, collectively marketing over 350 registered active ingredients in the form of more than 1,600 trade names and formulations. These products are regulated by the National Pesticides Council (NPC) under the National Pesticides and Pest Control Products Act (1998) and its accompanying by-laws.

Before the outbreak of the current war, Sudan imported between 4,000 and 5,000 tonnes (equivalent to 4–5 million litres or kilograms) of pesticides annually for use in irrigated and rain-fed agriculture, public health programmes, and veterinary services. These imports were intended to serve an estimated 60–70 million feddans of cultivated land. Since the onset of the war, legal imports have declined by more than 50 per cent over the last two agricultural seasons. This reduction has been accompanied by a sharp increase in the smuggling of pesticides across national borders, exploiting weakened regulatory oversight and deteriorating security conditions in several frontier regions (Bashir, 2023; HCENR, 2007). Despite efforts by the National Pesticides Council (NPC), state authorities, and law enforcement agencies under the Ministry of Interior, attempts to control illegal pesticide inflows have remained only partially effective.

At the continental level, Africa accounts for approximately 5 per cent of global pesticide consumption, with Sudan using roughly 5 per cent of African imports. In irrigated schemes, the average pesticide application rate is approximately three insecticide sprays per feddan per season and one herbicide application per feddan, primarily for cotton and selected vegetable crops such as tomato, onion, okra, eggplant, and cucurbits. In contrast, fewer than 20 per cent of rain-fed crops—including cotton, sorghum, sunflower, soybean, and sesame—receive herbicide treatment. Overall, imported pesticides cover no more than 20 per cent of the total cultivated area, implying that approximately 80 per cent of Sudanese crops are effectively produced without pesticide exposure and may therefore be considered *de facto* organic.

Until 2005, pesticide application in irrigated schemes was primarily managed by scheme administrations and supervised by trained crop protection specialists, particularly for cotton and wheat production. In contrast, pest control in vegetable production has largely remained under the responsibility of individual farmers. This has represented a persistent weakness in pesticide governance, as many farmers have lacked adequate training in pesticide selection, application timing, dosage determination, pre-harvest intervals, and safe disposal methods.

The use of non-recommended, smuggled, stolen, counterfeit, or expired pesticides has consequently become increasingly widespread, posing significant risks to food safety, occupational health, and environmental protection (Babiker, 1998; Bashir, 2004; Abdelbagi, 2005).

One of the most effective and sustainable responses to this challenge would be the revitalisation of the Farmers' Field Schools (FFS) programme, which was gradually discontinued during the early 1990s because of financial and institutional constraints. International experience has demonstrated that FFS approaches can substantially improve farmers' knowledge of integrated pest management (IPM), reduce unsafe pesticide use, and strengthen community-based agricultural extension systems (Bashir, 2008; Osibanjo et al., 2002).

Studies Conducted in Sudan

Systematic investigations into pesticide contamination in Sudan began in the early 1970s within the Toxicology Laboratories of the Agricultural Research Corporation (ARC), notably under the leadership of the late Professor Gaafar A. Elzorgani, and in the National Residue Analysis Laboratories of the Plant Protection Directorate (PPD) in Wad Medani, Ministry of Agriculture, led by the late Professor Khalid H. Elabbady. These pioneering efforts laid the foundation for national expertise in pesticide residue analysis and environmental toxicology (Elzorgani et al., 1994; Bashir, 2004).

During the 1980s and continuing through to early 2023, a series of intensive and increasingly sophisticated studies were conducted by academic institutions, particularly the University of Gezira and the University of Khartoum. These investigations were led by specialised research groups with strong analytical capacity, including work by Abdelbagi and colleagues at the University of Khartoum and by the present author at the University of Gezira (Abdelbagi, 2005; Bashir, 2011; Bashir, 2012).

The scope of these studies was comprehensive, encompassing virtually all environmental and biological matrices with potential relevance to pesticide exposure. These included soil, surface and groundwater, crops, food and feedstuffs, meat, poultry, eggs, milk, human breast milk, blood samples, adipose tissue from females, wild birds, and fish. Despite the breadth of this work, studies examining the spatial and temporal distribution of organochlorine pesticide (OCP) residues across environmental compartments remained limited, and the resulting datasets were often fragmented and difficult to compare because of methodological differences and discontinuities in monitoring programmes.

Nevertheless, a number of consistent findings emerged. Five major organochlorine pesticides—DDT, heptachlor, aldrin, dieldrin, and gamma-hexachlorocyclohexane (γ -HCH)—and/or their metabolites were repeatedly detected across multiple matrices (Abdelbagi, 2005; Bashir, 2011). DDT was the most extensively studied compound and was detected in nearly all investigated

compartments. The highest recorded concentration of DDT was found in animal milk, reaching approximately 109 ppm, indicating significant bioaccumulation and potential dietary exposure risks.

Heptachlor residues were detected at their highest levels in marine water samples, with concentrations reaching approximately 4.5 ppm. Aldrin residues peaked in soil samples at around 0.56 ppm, while dieldrin exhibited its highest concentrations in wild birds, reaching approximately 5.5 ppm. Gamma-HCH residues were most elevated in human breast milk, with concentrations of up to 0.48 ppm reported in certain studies. These findings collectively underscore the persistence, bioaccumulative nature, and wide environmental distribution of legacy organochlorine pesticides in Sudan (Abdelbagi, 2005; Bashir, 2011; Hassan and Bashir, 2025).

At present, Sudan retains limited but functional analytical capacity for pesticide residue monitoring. Two laboratories are considered adequately equipped to conduct such studies to international standards: the Shambat Laboratory at the University of Khartoum and the Mohamed Obeid Mubarak Laboratory at the University of Gezira. However, both facilities require sustained financial support to ensure the availability of analytical reagents, equipment maintenance, and continuous staff training. Importantly, the technical know-how and human resources necessary to establish new laboratories and to rehabilitate and upgrade existing facilities—particularly those of the ARC—remain available within the country.

Persistent Organic Pollutant and Obsolete Pesticide Inventories

In preparation for Sudan's obligations under the Stockholm Convention on Persistent Organic Pollutants (POPs), two national inventories were conducted in 2005 and 2013 to assess POPs pesticides, alongside a dedicated inventory of obsolete pesticides carried out in 2013. These inventories collectively covered 340 pesticide stores across the former unified Sudan, before the secession of the Republic of South Sudan. The surveys quantified stocks of obsolete pesticides, volumes of contaminated soil, contaminated equipment, and identified ten pesticide burial sites distributed across the country (Abdelbagi, 2005; HCENR, 2007).

Earlier studies had identified only a single burial site, located at Algourashi. The comprehensive inventories, however, revealed a far more extensive and complex legacy of pesticide mismanagement. Based on the findings, a National Implementation Plan (NIP) was developed by multidisciplinary teams under the supervision and leadership of the national focal point within the Higher Council for Environment and Natural Resources (HCENR). The NIP was subsequently submitted to the Council of Ministers and the Parliament and included several remediation scenarios designed to address obsolete pesticide stocks and contaminated sites, many of which remain applicable in the post-war recovery phase.

A particularly alarming finding emerged during the 2013 inventory: approximately 100 stores belonging to the Sudan Gezira Board (SGB), previously documented in the 2005 inventory, were no longer traceable. These stores, including their contents—whether new, expired, or obsolete pesticides—had effectively disappeared. Investigations revealed that neither the SGB, the Cotton Company, nor the Economic Administration of the National Security Forces possessed any records explaining the fate of these facilities. At present, the SGB reportedly owns only four stores from the original inventory. The destination and environmental fate of the pesticide stocks formerly housed in the missing stores remain unknown, representing a significant unresolved environmental and public health concern.

Analysis of inventory data revealed pronounced spatial variation in POPs contamination. The Gezira Scheme (excluding the Managil Extension) ranked first in terms of quantities of POPs pesticides, contaminated soil, and empty containers, with recorded amounts of approximately 901 tonnes of POPs pesticides, 2,324.6 tonnes of contaminated soil, and 267.3 tonnes of empty containers. Northern Darfur State ranked second in POPs pesticide quantities, with approximately 130.3 tonnes, followed by the Kassala–New Halfa region (58.8 tonnes) and River Nile State (13.7 tonnes). Conversely, several regions—including Gezira State (excluding SGB and sugar factories), Sinnar State, Blue Nile State, Gedaref, Juba, Wau, Malakal, West Kordofan, and Southern and Western Darfur—were reported to be free of obsolete POPs pesticide stocks at the time of the inventories.

With respect to contaminated soil, the SGB again ranked first, with 2,324.6 tonnes, followed by Sinnar and Blue Nile States (1,942.5 tonnes) and Northern Kordofan State (1,656.2 tonnes). Importantly, all surveyed states and storage sites exhibited some level of soil contamination, ranging from as little as 2 tonnes to as much as 18 tonnes at individual locations.

Empty and damaged pesticide containers—steel drums and plastic containers—constituted the third major category of concern. The SGB in Gezira ranked first, with 267.3 tonnes, followed by Northern Kordofan State (74 tonnes), the Managil Extension (42.5 tonnes), and the Northern State (36 tonnes). Four states—the River Nile, White Nile, Upper Nile, and Western Kordofan—reported no container-related problems, although it was suspected that containers from these areas may have entered informal markets.

Overall, the inventory results ranked the Gezira Scheme as the most affected area, followed by Sinnar and Blue Nile States, Northern Kordofan State, and Northern Darfur State. Wau, in southern Sudan, was identified as the least affected area. National totals were estimated at approximately 1,264.5 tonnes of POPs pesticides, 10,000 tonnes of contaminated soil, and 740 tonnes of contaminated containers, yielding an overall estimated burden of 11,813 tonnes of hazardous material requiring management and remediation.

Compounding these challenges, all records associated with the former

Shell Pesticides Formulation Plant were reportedly destroyed by the plant's administration prior to its dismantling. Consequently, data relating to historical use of aldrin, dieldrin, heptachlor, chlordane, and endrin remain incomplete and unreliable, further complicating efforts to reconstruct exposure pathways and environmental impacts (Elgadi, 1991; Abdelbagi, 2005).

The cumulative findings of the inventories point not merely to a technical problem of hazardous waste management, but to a broader crisis of environmental governance. Decades of weak regulation, fragmented institutional responsibility, poor documentation practices, and the erosion of agricultural extension systems contributed to the emergence of a long-term ecological burden whose effects now intersect with war, displacement, food insecurity, and public health vulnerability.

The National Implementation Plan (NIP)

In response to the findings of the national inventories of persistent organic pollutants (POPs) and obsolete pesticides, Sudan developed a National Implementation Plan (NIP) to fulfil its obligations under the Stockholm Convention. The NIP was formulated through a multi-sectoral process led by the national focal point at the Higher Council for Environment and Natural Resources (HCENR), with technical contributions from relevant ministries, research institutions, and international partners. The finalised plan was submitted to the Council of Ministers and the Parliament as the official national framework for addressing POPs-related risks (HCENR, 2007).

The NIP was structured around a series of Action Plans (APs) designed to address legislative gaps, institutional weaknesses, public awareness deficits, and the physical legacy of obsolete pesticides and contaminated sites. Although implementation was only partial prior to the current war, the NIP remains a technically sound and policy-relevant instrument that can be reactivated and adapted in the post-conflict recovery phase.

AP I: Legal Reform and Stronger Pesticide Enforcement

This one-year programme (2007) focused on reviewing and updating pesticide-related legislation to improve regulatory coherence and enforcement capacity. The estimated budget was USD 60,000. The objective was to align national legislation with international conventions and to enhance compliance monitoring across the pesticide life cycle (HCENR, 2007).

AP II: Strengthening Institutional Capacity

Designed as a three-year programme (2007–2009) with an allocated budget of USD 1,750,000, this action plan aimed to enhance the technical, administrative, and logistical capacities of key institutions involved in pesticide regulation, environmental monitoring, and enforcement. Emphasis was placed on training personnel, upgrading laboratories, and improving inter-agency coordination (Abdelbagi, 2005; HCENR, 2007).

AP III: Public Awareness on POPs, Waste, and Contamination

This five-year programme (2007–2011), with an estimated cost of USD 1,575,000, targeted farmers, pesticide handlers, local communities, and the general public. Its objective was to increase awareness of the health and environmental risks associated with POPs, obsolete pesticides, and contaminated sites, and to promote safer practices and community engagement in risk reduction (Bashir, 2008; Bashir, 2011).

AP IV: Environmentally Sound Obsolete Pesticide Management

Planned as a four-year programme (2007–2010) with a budget of USD 2,998,000, this action plan focused on the safe handling, repackaging, transport, and interim storage of obsolete pesticide stocks and contaminated materials, in accordance with internationally accepted environmental and occupational safety standards (HCENR, 2007).

AP V: Elimination of Stockpiles of Obsolete Pesticides

This four-year programme (2007–2010), with an estimated cost of USD 2,155,000, aimed at the final disposal of obsolete pesticide stocks through high-temperature incineration or other approved destruction technologies, either within the region or through export to certified international facilities, as permitted under international conventions (Osibanjo et al., 2002; HCENR, 2007).

Collectively, these action plans constituted a comprehensive and integrated national response to pesticide pollution. However, political instability, limited financial resources, institutional fragmentation, and, more recently, armed conflict prevented full implementation. As a consequence, many of the environmental and public health risks identified in the inventories remain unresolved.

In the context of post-war recovery, the NIP provides a ready-made framework for re-engagement with international environmental governance mechanisms and for mobilising donor support. Its phased structure, costed action plans, and alignment with global conventions make it particularly suitable for integration into broader national recovery and environmental rehabilitation strategies.

Recommendations for Remediation and Recovery

Based on the historical evidence, inventory findings, and documented environmental and public health impacts of pesticide use in Sudan, and drawing lessons from past misuses and regulatory failures, the following recommendations are proposed as priority actions for remediation and post-war recovery. These recommendations are grounded in scientific evidence, institutional feasibility, and alignment with international best practice.

- First, the private sector should be encouraged to establish pesticide manufacturing and formulation industries within Sudan, adopting the

highest available clean and environmentally sound technologies. Local production would improve regulatory oversight, reduce dependence on imports, and facilitate quality control, while also creating employment opportunities and strengthening national capacity.

- Second, purpose-built pesticide storage facilities must be established and rehabilitated across all states. These facilities should comply with international safety standards for ventilation, containment, fire protection, and environmental protection, thereby preventing further contamination of soil and groundwater and reducing occupational exposure risks.
- Third, comprehensive awareness-raising programmes targeting farmers, pesticide handlers, traders, and the general public are urgently needed. These programmes should address pesticide hazards, safe handling, correct application, disposal practices, and alternatives such as integrated pest management (IPM). Public awareness remains a cornerstone of risk reduction and long-term sustainability (Bashir, 2008; Bashir, 2011).
- Fourth, continuous in-service training programmes should be instituted for field inspectors, agricultural extension officers, and regulatory personnel. Training should cover pesticide chemistry, toxicology, risk assessment, inspection procedures, and emergency response, ensuring that regulatory frameworks are effectively implemented on the ground.
- Fifth, Sudan should establish and sustain Tier 3 analytical laboratories capable of detecting pesticide residues and other contaminants at trace levels across all relevant matrices. Existing laboratories should be upgraded, and new facilities established where necessary, supported by stable funding for equipment, reagents, maintenance, and human resource development (Abdelbagi, 2005; Bashir, 2012).
- Sixth, pesticide specification harmonization efforts between the National Pesticides Council (NPC) and the Sudanese Standards and Metrology Organization (SSMO) should be completed and enforced. This step is essential to ensure product quality, prevent the circulation of substandard or counterfeit pesticides, and align national standards with international norms.
- Seventh, central agricultural markets (malagas) should be equipped with simple, rapid pesticide residue detection tools. These screening systems would enable authorities to prevent contaminated produce from entering markets, thereby protecting consumers and reinforcing food safety regulations.
- Eighth, the Pesticide Inspection Administration of the Plant Protection Directorate (PPD) must be adequately resourced with trained personnel, operational funds, and logistical support. Effective inspection and enforcement are indispensable for controlling illegal pesticide trade and ensuring compliance with national legislation.

- Ninth, an annual, ring-fenced budget should be allocated for systematic food basket residue analysis conducted by designated laboratories and qualified researchers. Routine monitoring would provide early warning of emerging risks and generate evidence to guide policy and regulatory decisions.
- Finally, all remediation and recovery actions must be underpinned by strong political commitment and integrated into national reconstruction strategies. Addressing pesticide pollution is not merely an environmental issue; it is a public health, food security, and development imperative. Reinvigorating and implementing the National Implementation Plan (NIP) should therefore be treated as a priority component of Sudan's post-war recovery agenda.

Sudan's pesticide legacy is ultimately a governance issue as much as an environmental one. The collapse of monitoring systems, agricultural extension structures, and institutional accountability transformed chemical dependence into a long-term ecological burden. Post-war recovery therefore requires not only environmental remediation, but also the reconstruction of regulatory institutions, scientific capacity, and public trust.

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PART V
JUSTICE, CULTURE, AND NATIONAL RENEWAL

CHAPTER 14

WOMEN'S AGENCY AND SOCIAL REPAIR IN CONTEXTS OF CATASTROPHIC VIOLENCE, VIOLENCE, AND SURVIVAL IN SUDAN

Manal Mahdi

The war that erupted in Sudan in 2023 has generated one of the most severe humanitarian crises of the twenty-first century. Mass displacement, ethnic targeting, the destruction of civilian infrastructure, and widespread sexual violence have produced conditions that survivors and international observers increasingly characterise as genocidal in nature (United Nations Human Rights Council 2024; Straus 2016). Within this context of organised destruction, Sudanese women occupy a paradoxical position: they are among the primary targets of violence and dispossession, while simultaneously emerging as central actors in survival, care, and documentation.

Rather than approaching Sudanese women solely through a framework of victimhood, this chapter argues that women have become key interpreters and chroniclers of the war. Their testimonies, professional labour, and creative expression constitute a critical archive of the conflict and an essential foundation for future processes of justice, reconciliation, and national reconstruction (Felman and Laub, 1992; Sontag, 2003).

SNRF Policy Box: Women, Gendered Violence, and National Recovery

Gendered and sexual violence in Sudan has functioned as a strategic weapon of war, aimed at destroying families, communities, and social trust.

- State collapse has shifted core survival, care, and documentation functions to women, effectively making them frontline recovery actors.
- Women's care work, survival economies, and professional services now operate as informal social infrastructure sustaining civilian life.
- Women's testimonies, cultural production, and documentation constitute a primary national archive for truth-telling and historical memory.
- Excluding women's experiences from recovery and justice processes risks reproducing violence, erasure, and institutional failure.
- Post-conflict recovery must recognise women not only as victims, but as agents, historians, and ethical leaders of reconstruction.
- Transitional justice, health system recovery, and social rebuilding frameworks must systematically integrate women's knowledge and leadership.
- Sustainable national recovery in Sudan is unattainable without centering gender justice, care ethics, and women-led recovery pathways.

Gendered Architectures of Violence in Sudan

Violence in Sudan has long been structured through gendered hierarchies embedded in legal systems, economic relations, kinship norms, and militarisation (Hale, 1996; El-Battahani, 2013). The current war has intensified these dynamics, transforming women's bodies, homes, and livelihoods into strategic sites of warfare. Reports from displaced communities document patterns of rape, sexual slavery, forced marriage, abduction, and public humiliation deployed to terrorise populations and assert domination over contested territories (Amnesty International, 2024; UN Women, 2024).

Feminist scholarship on war demonstrates that sexual violence functions not only as an assault on individuals but also as a weapon aimed at destabilising families, fragmenting communities, and transmitting fear across generations (Enloe, 2000; Cohen, 2013). In Sudan, this weaponisation of gendered harm has been widely reported in Darfur, Khartoum, and Kordofan since the outbreak of hostilities (Human Rights Watch, 2024).

Beyond direct bodily harm, women experience structural violence resulting from the collapse of health services, food systems, and education—sectors in which women have historically been central providers and participants (Galtung, 1969; de Waal, 2015). The destruction of clinics undermines maternal

and reproductive health, the loss of markets erodes women's informal economies, and displacement intensifies unpaid care burdens. Violence thus operates simultaneously at physical, economic, and symbolic levels, targeting both women's lives and the social infrastructures they sustain.

Female Genital Cutting and Bodily Autonomy

While the current war has intensified spectacular forms of gendered violence, Sudanese women's bodies have long been sites of regulation and control through socially sanctioned practices predating the present conflict. Among these, female genital cutting (FGC) represents one of the most enduring and contested traditions in Sudanese society. Any serious examination of gendered harm and women's agency in Sudan must therefore situate wartime sexual violence within a broader historical architecture of bodily governance.

Female genital cutting in Sudan has historically been embedded in systems of kinship, marriageability, honor, and social belonging (Gruenbaum, 2001; Shell-Duncan & Hernlund, 2000). While many families have practiced it under the conviction that it preserves morality, ensures social acceptance, or protects daughters' futures, feminist and public health scholarship has consistently demonstrated its significant physical and psychological consequences, including obstetric complications, chronic pain, and trauma (WHO, 2018).

Importantly, FGC differs from wartime sexual violence in that it is not necessarily imposed by armed actors. Yet both practices share a common logic: the treatment of women's bodies as collective property, governed by communal norms rather than individual consent. In this sense, FGC reveals how gendered control can operate not only through militarised coercion but also through normalised cultural expectations.

However, the history of FGC in Sudan is also a history of contestation and reform. Sudanese women doctors, midwives, educators, religious scholars, and activists have been at the forefront of campaigns to abandon harmful practices. Community dialogues, public health education, legal reforms, and reinterpretations of religious texts have gradually reshaped public understanding (UNICEF, 2020; UNFPA, 2022). The criminalisation of FGC in Sudan's 2020 legal reforms marked a significant symbolic step toward recognising women's bodily integrity as a matter of national law.

The struggle against FGC demonstrates that harmful traditions are neither immutable nor culturally sacred in any fixed sense. They are historically produced and therefore historically transformable. Social change in this domain has occurred not primarily through external condemnation but through internal enlightenment—through conversations led by women within families, villages, professional associations, and religious communities.

Women's control over their own bodies is foundational to any meaningful concept of citizenship. Bodily autonomy is not a Western abstraction but a

prerequisite for dignity, health, and ethical selfhood. When women assert the right to refuse cutting, delay marriage, seek education, or access reproductive care, they enact a form of everyday political agency that challenges deeply embedded hierarchies.

Crucially, the movement against FGC in Sudan offers a model for confronting other harmful structures. It illustrates how change can emerge from within communities through knowledge production, professional leadership, and intergenerational dialogue. Enlightenment in this context does not signify cultural erasure; rather, it reflects a process of ethical reinterpretation—preserving valued traditions while abandoning practices that cause harm.

Within a genocidal war environment, defending bodily autonomy acquires renewed urgency. Where militarised actors seek to dominate women's bodies through rape and terror, affirming women's authority over their own physical integrity becomes both a personal and national act of resistance. The protection of girls from cutting, the provision of safe maternal care, and the expansion of reproductive health services must therefore be understood as components of recovery architecture, not merely social policy add-ons.

If Sudan is to rebuild on the foundations of dignity and justice, reform must extend beyond ending armed violence. It must also address longstanding cultural practices that circumscribe women's autonomy. Enlightenment—through education, ethical religious discourse, professional advocacy, and community engagement—remains the most sustainable pathway toward transformation.

In this sense, the campaign against FGC is inseparable from the broader project of national recovery. A society that enables women to exercise informed control over their bodies strengthens its moral infrastructure. Women's bodily autonomy becomes not only a health imperative but a cornerstone of democratic reconstruction.

Displacement and Feminised Survival

Mass displacement has reconfigured gendered labour across Sudan and in refugee-hosting countries. Women now constitute the backbone of survival economies in camps and informal settlements, organising food preparation, childcare, water collection, elder care, and informal trade (Turner, 2016; UNHCR, 2024). Mutual aid groups, neighborhood kitchens, rotating credit associations, and small-scale production networks have proliferated, often coordinated by women drawing on longstanding traditions of communal cooperation.

This feminisation of survival is not merely a response to crisis but an extension of women's prewar economic and social contributions that were historically undervalued or rendered invisible in official accounts (Benería, 2003; Badri, 2017). Under conditions of mass violence, these forms of labour become essential to sustaining life itself. Women's collective strategies, therefore, represent not only coping mechanisms but also material resistance to the logic of annihilation.

Women as Keepers of War Memory

A defining feature of contemporary conflicts is the emergence of civilian witnessing as a form of political practice (Assmann, 2011; Hirsch, 2012). In Sudan, women writers, poets, journalists, teachers, singers, podcasters, nurses, and activists have documented massacres, disappearances, hunger, and displacement. Social media diaries, oral testimonies, songs, and literary works circulate across diasporic and local networks, preserving civilian perspectives often excluded from official political discourse (El Jack, 2022; Salih, 2020).

Scholarship on trauma and testimony emphasises that witnessing is both a personal and collective act that counters denial, constructs memory, and asserts moral presence in the face of attempted erasure (Felman & Laub, 1992; Caruth, 1996). In contexts where formal institutions have collapsed, women's narrative labour functions as an alternative record-keeping system for national history.

Importantly, this cultural production is not only descriptive but also ethical. By naming violence, mourning losses, and affirming dignity, women's testimonies resist the dehumanisation that genocidal campaigns seek to impose (Butler, 2004; Mbembe, 2019).

Professional Care and Survival Ethics

Women's professional roles—particularly as nurses, midwives, doctors, teachers, and social workers—have acquired heightened significance during the war. Operating in makeshift clinics, schools, and shelters, they provide essential services under conditions of scarcity, insecurity, and pervasive trauma (WHO, 2024; UN Women, 2024). Feminist ethics of care scholarship frames caregiving not as private labour alone but as a political practice that sustains social worlds (Tronto, 1993; Robinson, 2011). In Sudan, such work entails profound emotional and physical costs. Women caregivers absorb collective grief, tend to wounded bodies, assist births in displacement camps, and support children who have witnessed atrocities. Their labour embodies an ethics of care that sustains not only physical survival but also social continuity.

Women as Historical and Political Agents

Understanding women and violence in Sudan requires moving beyond frameworks that position women solely as passive sufferers. Feminist political theory has long challenged such reductionist perspectives, emphasising women's agency even under extreme constraint (Mohanty, 2003; Mahmood, 2005).

Women are targeted by gendered violence, yet they are also historians of the conflict, organisers of survival, and producers of memory. Their economic initiatives, cultural production, and professional care practices constitute an alternative political infrastructure operating where the state has withdrawn or become predatory (Bayat, 2013; Fraser, 2016). This agency does not negate vulnerability; rather, it demonstrates how power and harm coexist. Women's

resilience is not evidence of the absence of violence, but of life persisting within its conditions.

Justice and Reconstruction

Any future processes of truth-telling, accountability, or reconstruction in Sudan must center women's testimonies and recognise their professional and cultural contributions. Transitional justice scholarship demonstrates that excluding women's experiences from post-conflict processes reproduces hierarchies of power and historical erasure (Ní Aoláin, Haynes & Cahn, 2011).

Conversely, integrating women's knowledge and leadership offers a pathway toward rebuilding institutions grounded in lived realities rather than militarised narratives (O'Rourke, 2013). Women must therefore be recognised not only as beneficiaries of postwar recovery but as its architects. Their experiences provide critical insight into how communities survive collapse, how trust can be rebuilt, and how dignity can be restored after mass harm.

Conclusion

The war in Sudan has subjected women to extreme forms of gendered and structural violence. At the same time, it has revealed women's indispensable roles as caregivers, economic organisers, professional responders, and chroniclers of history. Under conditions bearing the hallmarks of genocide, Sudanese women have sustained social life while recording the processes of its destruction.

To examine women and violence in Sudan is therefore to address harm and agency simultaneously, destruction alongside creativity, and silencing in tension with testimony. Any serious engagement with Sudan's present crisis or future recovery must recognise women not at the margins of history, but at its center.

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CHAPTER 15

TOWARDS A CULTURAL POLICY THAT LAYS THE FOUNDATIONS FOR A SUSTAINABLE NATIONAL CULTURAL PROJECT IN SUDAN

Kamal Yousif Ali

Cultural policy has remained marginal in Sudanese governance despite the country's extraordinary cultural diversity and the central role of culture in shaping social cohesion and national identity. This chapter argues that the absence of a coherent cultural policy has contributed to patterns of cultural marginalisation, institutional decline, and uneven national integration. Drawing on Sudanese intellectual debates and historical examples, the chapter examines the relationship between culture and development, the crisis of cultural practice under conditions of modernisation, and the persistent center-periphery imbalance in cultural representation. It then situates cultural policy within Sudan's contemporary recovery frameworks—particularly the Sudan National Recovery Framework (SNRF) and the Smart Village Network (SVN)—proposing institutional mechanisms for a sustainable national cultural project. Cultural renewal, the chapter concludes, is essential not only for artistic life but also for social reconciliation, local economic development, and the reconstruction of a shared national future.

Key Messages

This chapter will present a series of points related to cultural recovery, advocating that:

- *Culture must be treated as a pillar of national recovery* - Reconstruction after conflict requires rebuilding not only institutions and infrastructure but also shared meanings and social trust.
- *Sudan's cultural diversity is a national resource* - Plural cultural traditions should be recognised as equal components of national identity rather than marginalised as folklore.
- *Cultural policy is a development policy* - Creative industries, cultural tourism, crafts, and festivals can generate livelihoods and support local economies.
- *Institutional continuity is essential* - Cultural institutions must be insulated from short-term political changes and provided with stable governance structures.
- *Localisation of culture is critical* - Within the Smart Village Network

(SVN), cultural centres, festivals, and craft production should be integrated into local recovery strategies.

No project of national recovery in Sudan can be complete if culture remains marginal to public policy. Post-conflict reconstruction is often described in terms of institutions, infrastructure, security, health, education, and the economy. Yet societies do not live by administration and finance alone. They live through meanings, memories, languages, artistic forms, rituals, landscapes, and shared symbols. Culture, in this broader sense, is not a decorative addition to national life; it is one of the principal ways through which people understand themselves, relate to one another, and imagine a common future.

This is especially true in Sudan. The country's vast geography, environmental diversity, layered histories, and multiple social formations have produced an exceptionally rich cultural landscape. Sudan contains not one cultural stream but a plurality of traditions, artistic practices, languages, memories, and systems of value. This plurality could have become the foundation of a generous and confident national project. Instead, the absence of a coherent cultural policy has often meant that diversity was neglected, hierarchised, folklorised, or converted into a source of grievance. What should have been treated as national wealth was too often managed as peripheral surplus.

The concept of cultural policy, as Nour al-Din Sati notes, is relatively recent in its formal articulation and developed in parallel with the broadening of the concept of culture itself under UNESCO and related international debates (Sati, 2020). Culture is no longer confined to literature and the fine arts. It includes ways of life, systems of meaning, heritage, belief structures, everyday practices, and the forms through which communities express continuity and change. In this expanded sense, cultural policy is not merely support for artists or institutions. It is a framework for recognising, organising, protecting, circulating, and developing the cultural life of society.

UNESCO's contemporary cultural policy framework is especially relevant here. It treats culture not as an optional sector but as a foundation of human dignity, public policy, sustainable development, and recovery. UNESCO has described culture as "a global public good" and as fundamental to social cohesion, identity, and sustainable development, an understanding that strongly supports placing cultural policy within Sudan's national reconstruction agenda (UNESCO, 2022; UNESCO, 2024).

In Sudan, such a policy is urgently needed. The problem is not that Sudan lacks culture or that its communities await external activation. Cultural life across Sudan has always existed, and in many places, it has persisted despite neglect, repression, displacement, war, and market erosion. What is lacking is a national framework capable of enabling interaction among cultures on terms of equality, recognition, and mutual enrichment. The absence of such a framework has

had political consequences. Cultural exclusion has intersected repeatedly with economic marginalisation, regional inequality, and crises of national integration (Jaber, 2000).

The urgency of this argument has been made tragically visible during the current war. Sudan's museums, archives, heritage collections, and sites of memory have suffered looting, destruction, and institutional collapse. UNESCO warned of illicit trafficking and damage affecting museums and heritage institutions, including the National Museum in Khartoum, while Sudanese observers reported losses extending to regional museums and archives (UNESCO, 2024; ICOM, 2024). Such destruction is not merely material; it weakens collective memory and undermines the cultural foundations necessary for social reconstruction.

For this reason, cultural policy must be understood as part of state and society reconstruction in Sudan. Within the logic of the Sudan National Recovery Framework (SNRF), culture should be treated as a pillar of recovery, social cohesion, and institutional renewal. Within the logic of the Smart Village Network (SVN), culture should be localised as lived practice, community infrastructure, artisanal production, heritage preservation, intergenerational learning, and place-based economic opportunity. A sustainable national cultural project must therefore be both national and local: national in its recognition of plural belonging, and local in its rootedness in the cultural life of communities.

Sudan requires a new cultural policy founded on plurality, institutional continuity, democratic access, and developmental relevance. It first clarifies the concept of cultural policy, then examines the relationship between culture and development, the crisis of cultural practice in Sudan, the center-periphery problem, and the institutional decline that has deepened cultural marginalisation. This statement is proposing an institutional architecture for a sustainable national cultural project aligned with Sudan's broader recovery agenda.

Understanding Cultural Policy in the Sudanese Context

A useful cultural policy for Sudan must begin by clarifying what is meant by culture. Conventional definitions that limit culture to elite literature, fine arts, or formal performance are insufficient. In Sudan, culture must be understood as including all forms of creative and meaning-bearing activity through which communities shape life: music, dance, oral traditions, ritual, architecture, crafts, dress, foodways, festivals, performance, storytelling, built environments, and relations to land and memory. It includes both tangible and intangible heritage, the inherited and the improvised, the rural and the urban, the learned and the lived.

This broader understanding is essential because many of Sudan's cultural distortions have arisen precisely from narrow and hierarchical conceptions of culture. When culture is reduced to the products of the center, or to official literary and artistic forms, vast domains of Sudanese life are rendered secondary, unofficial, or merely folkloric. A sustainable cultural project cannot be built on such exclusions.

Cultural policy, therefore, should mean the deliberate formulation of plans, institutions, and mechanisms through which Sudan's multiple cultures are recognised, supported, documented, circulated, and developed within a shared national framework. Such a policy must not aim at homogenisation. Sudan's diversity is too deep, and too historically grounded, to be reduced to a melting pot model without violence to social reality. Rather, the purpose of policy should be to create conditions for coexistence, interaction, equitable visibility, and mutual recognition (Sati, 2020).

The absence of a cultural policy is itself a policy. Sati cites André Malraux to the effect that when states neglect culture, this neglect is not neutral but consequential: it permits cultural life to grow in a random and unsupported manner, while also allowing regimes hostile to culture to keep it weak, fragmented, and politically harmless (Sati, 2020). Sudan's experience confirms this insight. In practice, the country has often suffered from a policy of not having a cultural policy. This has meant institutional fragility, weak continuity, underfunding, and the repeated subordination of cultural life to political expediency.

Sati's contribution is especially relevant because it links cultural policy to institutional continuity, democratic pluralism, and the dangers of political neglect. His argument helps explain why cultural life cannot remain dependent on unstable political priorities if it is to sustain continuity, legitimacy, and broad social participation (Sati, 2020). In the Sudanese context, this provides an important conceptual basis for understanding cultural policy as a domain of public governance rather than discretionary patronage.

If Sudan is to establish a sustainable national cultural project, culture must be treated as a strategic domain of public life. Its institutions must not be left at the mercy of changing governments or partisan priorities. Sustainability here means continuity beyond regimes. It requires principles, structures, and social legitimacy deep enough to anchor cultural life in the everyday life of the people rather than in the temporary preferences of political elites.

Historical Roots of Cultural Distortion and Institutional Decline

The marginalisation of culture in modern Sudan has deep historical roots. Part of the problem lies in the restricted cultural outlook of significant sectors of the educated elite that emerged in the twentieth century. Although these elites played important roles in education, journalism, and political mobilisation, their understanding of culture was often narrow. Culture tended to mean literature, eloquence, and familiarity with Arabic and English texts, rather than a deep engagement with the lived diversity of Sudanese society.

Majdhoub Eidrous notes that the question of identity was present in the debates of the 1920s and 1930s and continued to assert itself in later decades despite repeated attempts to ignore it in formal politics (Jaber, 2000). Yet the elite response was often inadequate. Haidar Ibrahim similarly describes how "culture" came to mean literature and especially poetry, often heavily imitative of classical

Arab production and remote from the local environment (Ali, 2016). Muhammad al-Makki Ibrahim's criticism of the writers of the 1920s, cited by Haidar, is particularly striking: their production lacked local reference and connection to Sudanese land and reality.

Compounding this was a persistent overinvestment in politics at the expense of culture. Reform was imagined primarily as the domain of political parties, leaders, and state power, while cultural life was treated as secondary. Intellectuals, writers, and artists were often reduced to followers of political movements rather than recognised as makers of social meaning in their own right. Eidrous and Hilali both show how literary magazines that began with cultural aspirations gradually shifted toward politics (Jaber, 2000; Hilali, 2019). Al-Fajr, perhaps the most famous example, declared its commitment to literature and the arts at its founding, only to reorient itself toward political and social issues within a year (Hilali, 2019).

This pattern of aborted cultural initiative continued in institutional life. Cultural magazines disappeared. Specialised arts institutions narrowed their missions. The Folk Arts department of the Institute of Music, Theatre, and Folk Arts was abolished when the institution was transformed. The Folk Arts Troupe declined and disappeared. The acrobatics troupe that once represented a remarkable investment in youth arts eventually languished. Friendship Hall and other gifted cultural assets were not consolidated into vibrant cultural ecosystems. The Folklore Studies Center and other potentially foundational institutions did not develop into durable national anchors. Hashim Mirghani's phrase "burying the larvae" captures the tragedy well: Sudan repeatedly generated the beginnings of cultural institutions but failed to nurture them into maturity (Mirghani, 2021).

The cumulative effect has been double marginalisation: Sudan did not adequately value its internal cultural plurality, nor did it effectively position its culture within wider global circuits.

Culture, Development, and the Social Value of Creativity

The relationship between culture and development is often misunderstood in Sudanese public discourse. Development is frequently imagined in purely material or technocratic terms, while culture is relegated to symbolism, entertainment, or identity politics. This separation is misleading. Culture contributes directly to development, not only by shaping values and social trust, but also by generating livelihoods, strengthening local economies, sustaining knowledge systems, and enabling communities to represent themselves on their own terms.

When artistic and cultural practice moves from private expression into a sphere of social value and material return, it becomes developmental in a concrete sense. It strengthens skills, confidence, organisation, exchange, and income generation. A craft tradition, a performance form, a harvest festival, a local architecture practice, or a food heritage can become the basis of employment,

local enterprise, tourism, cultural education, and interregional exchange. Culture, in other words, is not only expressive; it is productive.

This argument is consistent with wider international literature linking culture to development. UNESCO increasingly frames the creative economy as a significant contributor to livelihoods, employment, local entrepreneurship, and social resilience, particularly in fragile and post-conflict settings (UNESCO, 2021; UNCTAD, 2022). Creative industries, festivals, artisanal production, heritage economies, and cultural tourism therefore represent not symbolic luxuries but practical components of developmental recovery.

The Sudanese case offers abundant examples. Local festivals and seasonal celebrations can stimulate domestic and international tourism, encourage artisanal production, and create markets for music, instruments, clothing, jewelry, food products, and recorded materials. Communities that are enabled to organise and present their cultural productions under dignified conditions do not simply display identity; they activate economic circuits. This is one of the strongest arguments for linking cultural policy to broader recovery planning.

Such an approach also supports what may be called profound democracy in cultural life: the recognition that creative capacity is not the monopoly of metropolitan elites. Rural, popular, domestic, and inherited forms of production carry as much artistic and civilisational value as those conventionally classified as modern or urban. There is no sound basis for placing one above the other in a developmental hierarchy. Each form is rooted in distinct conditions of production and meaning; each can be refined, circulated, and economically activated without losing its character.

From the standpoint of SNRE, this argument is highly significant. National recovery requires more than rebuilding ministries and services; it requires rebuilding social confidence and local economic capability. Culture can serve both aims. From the standpoint of SVN, the point is even more concrete: a smart village is not merely a digitally connected service node. It is also a cultural habitat. Its vitality depends on whether local knowledge, artistry, architecture, festivals, memory, and intergenerational teaching are preserved and linked to dignified forms of livelihood. Cultural policy must therefore be integrated into local development rather than treated as a later embellishment.

The Crisis of Cultural Practice: Between Authenticity, Renewal, and Misunderstood Modernity

A major crisis in Sudanese cultural life lies in the confusion between development and replacement. In many contexts, modernisation has been interpreted as the abandonment of local forms in favor of imported ones, often without critical reflection on function, aesthetic suitability, historical value, or social meaning. The result has not been genuine renewal but cultural erosion.

The examples cited in the original paper are telling. Imported instruments

such as bongos or the electronic organ have in many contexts displaced local drums and melodic systems, often flattening tonal distinctions and altering performance practices. Traditional furniture, ritual objects, and women's ceremonial arts have receded in urban life. Wedding processions have been replaced by imported models alien to Sudanese musical and performative traditions. Local building materials and climatically appropriate architecture have been demolished in favor of reinforced concrete and steel structures unsuited to high temperatures and often empty of historical character. The destruction of architecturally significant landmarks, such as the old Omdurman Mosque, stands as a particularly visible example of this mentality.

These examples should be understood not as nostalgic objections to change, but as indicators of modernisation without cultural evaluation. Development becomes culturally destructive when local forms are displaced before their ecological suitability, symbolic meaning, historical significance, and adaptive potential are critically assessed (Jaber, 2000; Sati, 2020). The problem, therefore, is not modernisation itself, but modernisation detached from cultural continuity.

These developments raise difficult but necessary questions. To what extent do Sudanese communities recognise the civilisational value of what they already possess? Why is the imported so often assumed to be advanced while the local is assumed to be backward? How much of this attitude results from shallow notions of progress, consumer mimicry, or internalised cultural inferiority?

These questions do not imply a romantic call for cultural freezing. No culture lives by preservation alone. Artists have every right to innovate, experiment, and renew their tools and forms. Sudanese music itself demonstrates this. The country's modern musical history includes sustained innovation, including the use of modern instruments, orchestration, arrangement, and hybrid genres. The challenge is not whether change should occur, but how. Renewal should emerge from critical engagement with inherited forms, not from their unthinking displacement.

Comparative examples are instructive. Asian societies such as China, India, and Iran have modernised musical performance while preserving the distinctive physical and tonal characteristics of long-standing traditional instruments. Latin American cultures have retained diverse percussion traditions rather than replacing them wholesale with imported substitutes. These examples show that modernity need not be achieved through self-erasure. Technology can be used to enhance local production, extend circulation, improve packaging, and create access to wider markets without dissolving cultural specificity.

For Sudan, the proper concept of development in the cultural field should therefore be one of adaptive continuity: using new means to strengthen and disseminate local forms rather than discard them. The recent interest in packaging beverages such as tabaldi, karkade, and aradeeb offers a modest but relevant example. Such products can be modernised, branded, and marketed without losing their rootedness in local ecology and culture.

Cultural Marginalisation, National Integration, and the Center-Periphery Problem

The issue of cultural policy in Sudan cannot be separated from the question of marginalisation. The center-periphery problem has both an internal and an external dimension. Internally, the cultural productions associated with central Sudan, especially Arab-Islamic and metropolitan forms, have often enjoyed institutional privilege and broader visibility, while other cultures have been subordinated, simplified, or classified as folklore. Externally, Sudanese culture as a whole has remained relatively marginal to global cultural circuits.

On the internal front, several thinkers have noted the long-standing dominance of the culture of the center and the consequent relegation of other cultures to the margins. Hisham Omar al-Nour describes this as a comprehensive crisis in which the culture of central Sudan assumes the position of norm, while other cultures are granted limited space as “popular” culture, folk dance, or decorative diversity rather than recognised as co-equal constituents of the national whole (Jaber, 2000). Sati similarly links this imbalance to broader patterns of neglect, especially in remote areas historically excluded from sustained state attention (Sati, 2020).

This is not a minor representational problem. Cultural marginalisation is inseparable from political and economic marginalisation. When a people’s language, music, memory, or symbolic life is neglected, they correctly infer that their presence in the national imagination is diminished. This helps explain why cultural grievance has often fed into conflict in South Sudan before secession, in Darfur, in the Nuba Mountains, and in Blue Nile. The denial of equal cultural standing is often an early form of denying equal citizenship.

The appropriate alternative is not forced fusion but structured coexistence. Sati is right to reject simplistic notions of “melting” and to argue instead for interaction and coexistence (Sati, 2020). Sudan’s plurality should not be dissolved into one authorised identity. It should be institutionally enabled to converse, circulate, and cooperate.

The external dimension is equally important. Sudanese culture has not adequately entered global circulation on its own terms. Abdelaziz Hussein al-Sawi calls for a scientific diagnosis of globalisation together with honest recognition of Sudan’s strengths and weaknesses, so that engagement with the world can occur from a position of confidence rather than passive consumption (Jaber, 2000). Abdullah Bula goes further, arguing that specificity must not be reduced to exotic display. A living culture enters universality not by presenting itself as an ethnographic curiosity but by engaging critically with its own reality and contributing to broader human questions (Jaber, 2000).

Abdullah Bula’s intervention is particularly instructive here. Sudanese culture should not enter global circulation merely as folkloric spectacle or ethnographic curiosity. Rather, its contribution to universality lies in the capacity

of local cultural experience to speak meaningfully to broader human concerns through critique, creativity, memory, and lived historical experience (Jaber, 2000). This reinforces the need for translation, publishing, festivals, cultural diplomacy, and institutional support that move Sudanese cultural production beyond exoticism toward intellectual and artistic engagement.

This insight is crucial. Sudanese creators must be enabled to move beyond the “exotic ghetto” and into spaces of experimentation, critique, and universal contribution. That requires institutions, translation, documentation, festivals, publishing, digital circulation, and international cultural strategy. Here again, cultural policy is not ornamental. It is the bridge between local creativity and broader civilisational presence.

Cultural Policy as a Pillar of Recovery: Aligning with SNRF and SVN

In post-conflict Sudan, cultural policy must be repositioned from the margins to the center of recovery thinking. Within SNRF, culture should be treated as a strategic domain linked to national healing, local development, citizenship, memory, and social cohesion. This means recognising that cultural institutions are not peripheral amenities. They are part of the architecture through which a fractured society reconstructs common life.

A recovery-oriented cultural policy should therefore pursue at least five goals. It should promote equal recognition of Sudan’s diverse cultures; protect and document heritage endangered by war and neglect; support youth and community participation in cultural production; connect culture to livelihoods and local economies; and strengthen national unity through plural rather than assimilative frameworks.

Within SVN, this policy must acquire spatial and institutional form. Every smart village or village hub should include a cultural dimension: a space for performance, oral history, local archives, craft production, children’s arts, women’s cultural work, festival organisation, and digital documentation. Cultural life should not be centralised in Khartoum or a few urban institutions. It should be built into community recovery. A local cultural center can become as important to village resilience as a clinic, school, or water point, because it helps preserve belonging, dignity, and intergenerational continuity.

This is also where culture and development meet most concretely. Cultural tourism, artisanal production, music, food heritage, storytelling, and festival economies can all be integrated into localised recovery packages. In this sense, SVN provides a practical mechanism for translating cultural policy from national principle into lived infrastructure.

Toward an Institutional Architecture for a Sustainable National Cultural Project

Sudan now requires an institutional structure capable of supporting cultural

policy with continuity, breadth, and democratic legitimacy. The proposal in the original paper remains valuable and can be refined for recovery conditions.

At the apex should be a *Supreme Council for Culture, Literature, and the Arts*, established not as a symbolic appendage of government but as a technically competent, plural, and nationally representative body. Its purpose would be to formulate cultural strategy, coordinate documentation, sponsor research, guide national programs, and protect cultural life from erratic politicisation. The Ministry of Culture would retain an administrative and political role, including financing, staffing, external representation, and state-level advocacy, but the Council should have sufficient professional autonomy to ensure continuity and credibility.

Below it, specialised national councils could be established for music, theatre, visual arts, literature, audiovisual arts, domestic arts and crafts, and children's arts and culture. Each should embrace rural and urban, traditional and contemporary forms alike. Each should have branches in all states and eventually, through SVN logic, in district and village cultural networks. Their functions should include documentation, training, publication, exhibitions, local festivals, rotating national festivals, digital archiving, and support for creators.

The Supreme Council should also sponsor a peer-reviewed cultural journal, regular workshops and symposia, an annual conference, and an international Sudan cultural festival. It should coordinate with universities, civil society organisations, diaspora networks, and international partners. It should support publication, translation, recording, and digital dissemination. It should play a role in selecting qualified cultural attachés and in positioning Sudanese culture internationally.

Funding should come from a mix of public allocation, donor support, civil society partnership, revenue from events, and cultural production income. If properly developed, culture itself can become a modest but meaningful contributor to national income.

Conclusion

Sudan's cultural crisis is not a secondary matter. It is deeply entangled with the crises of identity, marginalisation, governance, and development that have shaped modern Sudanese history. For too long, culture was either neglected, instrumentalised, or reduced to narrow official forms. The result has been institutional weakness, social exclusion, and a diminished national imagination.

A sustainable national cultural project requires a different path. It requires a cultural policy founded on plurality, dignity, interaction, and continuity. It requires institutions capable of surviving political change. It requires linking cultural life to recovery, livelihoods, education, youth participation, and local development. Above all, it requires treating Sudan's diverse cultures not as competing residues to be managed, but as co-equal foundations of the national future.

Within SNRF, culture must become a pillar of reconstruction. Within SVN, it must become a lived and localised practice of recovery. Only then can Sudan begin to transform cultural diversity from a history of marginalisation into an architecture of renewal.

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CHAPTER 16

REBALANCING SUDAN'S URBAN HIERARCHY AND URBAN SYSTEMS FOR NATIONAL RECOVERY

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Sudan's spatial development has long been marked by profound imbalance. Economic activity, political authority, infrastructure, and public services have been disproportionately concentrated in the capital city of Khartoum, creating what urban geographers describe as a primate city system. In such systems a single metropolis dominates the national urban hierarchy, often stunting the growth of secondary cities and weakening rural economies (Pacione, 2009).

The consequences for Sudan have been severe. Over-centralisation has contributed to regional inequality, economic marginalisation, forced migration, and political tensions between the centre and the periphery (Abdelgadir, 2010; de Waal, 2007). The devastating war that erupted in 2023 has further exposed the fragility of this urban structure. With Khartoum severely damaged and millions displaced, Sudan now faces a historic opportunity to rethink its spatial development model.

Within the broader Sudan National Recovery Framework (SNRF) and the Smart Village Network (SVN) initiative, rebuilding Sudan requires not only physical reconstruction but also the rebalancing of the national settlement system. A sustainable recovery must strengthen rural communities, empower secondary cities, and create functional linkages across the national territory.

Khartoum and the Primate City Problem

Khartoum's growth has often been described as excessive and structurally unhealthy. Scholars have long observed that Sudan's capital has evolved into an overwhelmingly dominant metropolitan centre (Collins, 2008; Assal, 2008; El-Battahani, 2016). Over the past five decades, Khartoum's population has expanded dramatically, increasing approximately thirty-eight times since the 1970s (World Population Review, 2026). By the early 2020s the population of Khartoum roughly equalled that of the next thirty largest Sudanese towns combined. This concentration produced several structural distortions:

- Economic imbalance: disproportionate allocation of investment and employment.
- Administrative centralisation: national institutions clustered in the capital.
- Infrastructure inequality: rural areas remain underserved.
- Migration pressure: displacement and rural poverty drove large inflows.

As Atta El-Battahani argues, Khartoum's growth represents a form of pathological urban expansion, characterised by the accumulation of population without the integration of productive economic structures (El-Battahani, 2016). The result has been what Assal describes as “aggregation without integration”—a city swollen by migration but lacking the economic and institutional capacity to absorb it (Assal, 2008).

Policy Box: Polycentric Urban Systems in Post-Conflict Countries

Post-conflict countries often inherit highly distorted spatial systems characterised by excessive concentration of political power, economic activity, and infrastructure in a single capital city. Such primate city structures tend to emerge from decades of centralised governance, uneven development policies, and conflict-driven migration. While capitals may function as administrative hubs, their disproportionate growth frequently undermines balanced national development and exacerbates regional inequality.

Urban planning literature increasingly recommends polycentric development as a corrective strategy for post-conflict reconstruction (Roberts, 1972; Pacione, 2009; UN-Habitat, 2020). A polycentric urban system distributes economic and administrative functions across multiple urban centres rather than concentrating them in a single metropolis. These centres operate within a coordinated network of cities, towns, and rural settlements, each performing specialised roles within the national economy.

Experiences from several post-conflict societies illustrate the benefits of such approaches. In Rwanda, the government deliberately strengthened secondary cities such as Musanze, Rubavu, and Huye to reduce Kigali's dominance while stimulating regional economies. Mozambique adopted a similar strategy after its civil war by investing in intermediate cities like Beira and Nampula, transforming them into regional growth hubs. Afghanistan's National Urban Policy likewise emphasised strengthening provincial capitals to reduce the demographic pressure on Kabul while expanding access to services in peripheral regions.

Polycentric systems generate several advantages for fragile states:

1. Territorial stability. Distributing economic opportunities across regions reduces migration pressures and mitigates grievances between centre and periphery.
2. Economic resilience. Diversifying urban centres spreads productive activity across multiple locations, making national economies less vulnerable to shocks affecting a single city.
3. Improved service delivery. Regional cities can host universities, hospitals, and administrative institutions closer to rural populations.
4. Enhanced governance. Multi-level governance structures strengthen collaboration between national, regional, and local authorities. For Sudan, adopting a polycentric model aligns closely with the principles of the Sudan National Recovery Framework (SNRF) and the Smart Village Network (SVN).

By empowering secondary cities while revitalising rural communities, Sudan can build a spatial system that promotes balanced development, reduces excessive concentration in Khartoum, and strengthens national cohesion.

Settlement Hierarchies in Urban Theory

Urban geography provides well-established frameworks for understanding how settlements function within national spatial systems. One of the most influential models is Central Place Theory, first proposed by Christaller (1966), which explains how settlements of different sizes serve surrounding populations through hierarchical networks of services. Similarly, Doxiadis' theory of Ekistics views human settlements as integrated systems evolving through interactions between population, environment, infrastructure, and institutions (Doxiadis, 1968).

In modern urban planning, scholars emphasise polycentric development, where multiple urban centres share economic and administrative functions rather than concentrating power in a single metropolis (Roberts, 1972; Pacione, 2009). Balanced settlement hierarchies typically include villages, small towns, regional cities and metropolitan centres. Each level performs distinct but interconnected functions within the national economy.

Sudan's Settlement Geography

Sudan's settlement pattern reflects its vast geography and ecological diversity. Despite its immense territory, population distribution is highly uneven. Most settlements lie

along a broad arc stretching from the Red Sea coast through eastern Sudan, the Gezira agricultural region, Khartoum, Kordofan, and Darfur. This belt contains the majority of the country's urban centres and agricultural production. Northern Sudan, by contrast, remains sparsely populated, with settlements largely confined to the Nile corridor. Within this spatial structure, Sudan contains tens of thousands of villages, hundreds of towns and several dozen cities (Schneider, 2018).

These settlements differ significantly in climate, architecture, economic activity, and cultural traditions. Coastal cities such as Port Sudan serve as maritime gateways, while agricultural towns like Wad Medani function as regional market centres. In Darfur and Kordofan, towns historically emerged as trade hubs connecting pastoral and farming communities. However, despite this diversity, national planning has often imposed uniform development models that ignore local environmental and economic realities.

War and the Collapse of the Urban System

The current war has profoundly disrupted Sudan's urban geography. Major cities have experienced infrastructure destruction, industrial collapse, service breakdown and massive displacement. Millions of internally displaced persons have moved toward relatively safer towns, creating overcrowded settlements and informal camps. At the same time, many productive areas have been abandoned. The destruction of Khartoum, once the country's administrative and economic centre, has dramatically exposed the risks of excessive spatial concentration. In this context, reconstruction must address not only damaged infrastructure but also the structural imbalance of Sudan's settlement system.

Rebalancing the National Urban System

Post-war reconstruction provides an opportunity to restructure Sudan's spatial development strategy. Rather than rebuilding the previous centralised model, recovery should promote a balanced network of settlements. Three principles are central:

- Polycentric development: Economic and administrative functions should be distributed among several regional cities.
- Regional specialisation: Cities should develop economic roles based on local comparative advantages.
- Rural-urban integration: Villages, towns, and cities must operate within a mutually supportive economic system.

The Role of Secondary Cities

Secondary cities are essential for balanced territorial development. Urban development research increasingly recognises the importance of intermediate cities—urban centres that link rural regions to national and global markets

(Roberts, 1972). In Sudan, several cities possess strong potential to serve as regional growth poles: Port Sudan, Kassala, Wad Medani, El Obeid, Nyala, El Fasher, Kosti, and Damazin. Strengthening these cities would relieve demographic pressure on Khartoum while stimulating regional economies. Investments should focus on industrial zones, logistics infrastructure, universities, hospitals, and regional markets.

Table: Priority Secondary Cities for Sudan’s Recovery

City	Region	Strategic Role	Key Development Priority
Port Sudan	Red Sea State	National maritime gateway	Port modernisation, logistics hub, industrial corridor
Kassala	Eastern Sudan	Agricultural trade centre	Irrigation agriculture, cross-border trade
Wad Medani	Gezira	Agricultural and research hub	Agro-industry, university expansion
El Obeid	North Kordofan	Regional transport node	Livestock markets, transport logistics
Kosti	White Nile	River trade and industrial centre	River transport revival, agro-processing
Nyala	South Darfur	Regional commercial hub	Reconstruction, trade networks
El Fasher	North Darfur	Administrative and security centre	Public services, regional governance
Damazin	Blue Nile	Hydropower and agriculture	Energy infrastructure, irrigation
Dongola	Northern State	Nile Corridor Centre	Tourism, desert agriculture
Gedaref	Eastern agricultural belt	Grain production centre	Storage facilities, export logistics

Strategic objectives

Strengthening these cities would:

- reduce demographic pressure on Khartoum
- stimulate regional economic growth
- strengthen rural-urban market linkages
- support decentralised governance
- improve service accessibility across Sudan
- economies to national infrastructure, markets, and institutions.

Infrastructure and Connectivity

Balanced settlement systems require strong physical and digital connectivity. Reconstruction planning should therefore prioritise integrated infrastructure networks, including:

- Transport systems: national highways, regional roads, rail corridors, and airports and ports
- Digital infrastructure: fibre-optic networks, mobile communication, satellite connectivity
- Economic logistics: agricultural storage facilities, transport hubs, and regional markets

These networks enable villages to connect with towns and cities, facilitating the flow of goods, services, and information.

Governance: Top-Down and Bottom-Up

Urban planning success depends not only on technical design but also on governance structures. Historically, Sudan's development policies have been dominated by a top-down model, where central authorities impose planning decisions without meaningful local participation. However, purely centralised planning often fails to reflect local realities. Conversely, grassroots initiatives lacking institutional support may struggle to achieve scale. A more effective approach combines national strategic planning, decentralised implementation and community participation.

Participatory Planning in Sudan

Participatory development methods offer valuable tools for bridging the gap between governments and communities. Approaches such as Rapid Rural Appraisal (RRA), Participatory Rural Appraisal (PRA), Participatory Learning and Action (PLA) enable communities to articulate priorities and participate in development planning.

Sudan previously experimented with such approaches through the *Area Development Schemes (ADS)* implemented with UNDP support in the 1990s. These

initiatives empowered communities to select and implement local development projects, demonstrating the effectiveness of structured participation.

More recently, digital technologies have enabled innovative forms of civic participation. During flood emergencies, for example, volunteer networks used mobile phones to generate real-time geographic data through a form of digital *nafeer*, illustrating how community action can complement formal institutions.

Smart Village Network and Urban Balance

The Smart Village Network (SVN) provides a framework for integrating rural development with national spatial planning. Within the SVN model villages form the foundation of social and economic life, service towns provide markets and public services, regional cities host advanced institutions, national cities coordinate large-scale economic systems. Rather than competing with urban development, the Smart Village Network strengthens the entire settlement hierarchy by revitalising rural economies and reducing forced migration to major cities.

Conclusion

Sudan's war has revealed the vulnerabilities of an excessively centralised urban system dominated by Khartoum. Rebuilding the country therefore requires more than physical reconstruction—it demands a new spatial development paradigm.

A balanced settlement hierarchy, integrating villages, towns, and cities, offers a viable pathway toward national stability and economic recovery. By strengthening secondary cities, improving infrastructure connectivity, and promoting participatory governance, Sudan can build a more resilient and equitable territorial system.

Aligned with the broader vision of the Sudan National Recovery Framework and the Smart Village Network, such an approach places rural communities at the centre of national renewal while ensuring that cities serve as engines of regional development.

Rebalancing Sudan's urban hierarchy is therefore not merely a planning exercise. It is a cornerstone of the country's long-term recovery and the foundation for a more inclusive and sustainable future.

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PART VI

RECOVERY FROM BELOW: THE NATIONAL RECOVERY ARCHITECTURE

CHAPTER 17

RECOVERY FROM BELOW: THE NATIONAL RECOVERY ARCHITECTURE

Ahmed El Safi

Sudan's contemporary crisis is more than a war, humanitarian emergency, or episode of institutional fragility. Since 2023, the country has experienced a multidimensional rupture affecting governance, health systems, education, livelihoods, environmental management, and public trust. Hospitals ceased functioning, schools closed, supply chains fractured, and millions experienced displacement, insecurity, and social dislocation. Yet the conflict did not create these vulnerabilities anew. Rather, it exposed and intensified structural weaknesses accumulated over decades: uneven territorial development, fragile institutional legitimacy, inconsistent public investment, political exclusion, and unstable relations between centre and periphery (Mamdani, 1996; de Waal, 2015). Sudan's present condition, therefore, reflects not only violent rupture but the convergence of long-standing institutional fragility with acute political collapse.

Collapse alone, however, does not explain Sudan's experience. Running through the chapters of this volume is another, quieter reality: endurance. Even where institutions weakened, social life rarely disappeared. Health workers sustained care under extraordinary pressure, teachers improvised educational continuity, neighbourhood committees organised relief, and women, youth, kinship networks, religious institutions, and professional associations absorbed shocks that formal governance systems could no longer manage. These experiences should neither be romanticised nor misunderstood. Communities cannot indefinitely substitute for functioning public institutions, nor should resilience become an excuse for state retreat. Yet they reveal something fundamental: Sudan's capacity for social organisation survived institutional disruption (Scott, 1998; Fukuyama, 2014).

This distinction matters because societies recover differently when institutions weaken while social capacity endures. Recovery becomes less a matter of invention than reconnection. The challenge is not simply to reconstruct infrastructure or reactivate ministries, but to reconnect institutions with capabilities already embedded within everyday life: trust, reciprocity, local knowledge, collective memory, and practical cooperation (Granovetter, 1985; North, 1990). It is from this premise that Recovery from Below emerges.

The phrase should not be mistaken for romantic localism, hostility toward national governance, or nostalgia for village life. Nor does it imply that national institutions are secondary to community organisation. Rather, it begins with a

practical proposition: institutions become durable when socially embedded. Public systems acquire legitimacy when citizens encounter them meaningfully in everyday life, when governance becomes intelligible rather than distant, and when services are experienced as reliable rather than episodic (Ostrom, 1990).

Across Africa, analogous traditions repeatedly linked institutional legitimacy to social participation. In Tanzania, Julius Nyerere argued that durable development depended upon collective agency and shared responsibility rather than technocratic administration alone (Nyerere, 1968). Similarly, Kwasi Wiredu highlighted traditions of deliberative and consensual governance grounded in social legitimacy rather than procedural formality (Wiredu, 1996). Sudan itself offers important precedents. The work of El Tigani El Mahi demonstrated the therapeutic significance of culturally grounded and socially embedded care, while the Umdubban therapeutic village illustrated how healing, participation, and social continuity could reinforce one another. Comparable lessons emerged from the Aro Village experiment associated with Thomas Adeoye Lambo in Nigeria, where psychiatric care proved more effective when integrated into community life rather than isolated from it (Lambo, 1960).

These examples matter not because Sudan should replicate them mechanically, but because they reinforce a wider proposition: institutions work best when they remain socially intelligible and territorially grounded. This insight clarifies a problem that repeatedly undermines post-conflict reconstruction: the difference between rebuilding and redesigning. Post-war settings frequently experience an influx of projects—schools rehabilitated, clinics repaired, livelihoods programmes launched, governance workshops convened, and humanitarian assistance expanded. Many such interventions are necessary. Yet reconstruction often disappoints because projects do not automatically become systems.

A clinic without medicines, referral pathways, transport, financing, or trust remains vulnerable. A school without teachers, psychosocial continuity, nutrition, or local stability rarely restores education meaningfully. Agricultural support disconnected from water systems, ecological management, transport, or markets seldom stabilises livelihoods. The problem is not effort alone. It is organisation. Sudan's challenge is therefore architectural. Projects address immediate problems; institutions sustain continuity.

Projects are Episodic - Systems Endure.

The crisis itself revealed the interdependence of systems too often treated separately. Health deterioration cannot be isolated from displacement, interrupted education, food insecurity, weakened livelihoods, environmental pressure, or declining trust. Governance legitimacy similarly depends upon whether citizens experience institutions as fair, useful, and predictable in ordinary life.

Several chapters in this volume point repeatedly toward this outcome. The chapter on epidemic intelligence demonstrates that preparedness depends not merely on laboratories or surveillance technologies, but on communication

systems, mobility, trust, local reporting pathways, and territorially embedded public health systems. The primary health care chapter illustrates that resilience emerges not only through facilities but through prevention, accessibility, participation, and legitimacy. Governance chapters stress accountability and distributed authority, while educational analyses highlight continuity, psychosocial stability, and civic capability. Livelihood and environmental chapters further demonstrate how fragility deepens when systems cease communicating with one another.

Read collectively, these contributions point toward a wider conclusion: Sudan's recovery requires coherence. Such coherence cannot emerge through administrative centralisation alone, nor through fragmented local improvisation. Communities possess contextual intelligence, practical knowledge, and social legitimacy. National institutions remain indispensable for redistribution, standards, infrastructure, financing, preparedness, and territorial equity. Durable recovery, therefore, depends upon stronger relationships between scales of governance rather than dominance by any single level. It is precisely this logic that informs the **Smart Village Network (SVN)**.

Within Recovery from Below, SVN does not describe model villages, technology pilots, or externally engineered development schemes. Rather, it proposes an organising framework through which communities become sites of coordinated resilience, institutional participation, and practical capability. Villages—and urban neighbourhoods by extension—matter because they are where vulnerability is experienced, trust accumulates, and institutions become visible. A village becomes “smart” not because technology arrives, but because institutions begin to work together.

- Health systems support education.
- Water systems strengthen health.
- Livelihoods reinforce nutrition.
- Knowledge circulates.
- Preparedness improves.
- Participation becomes meaningful.
- Collective problems become governable.

Smartness, in this sense, concerns institutional intelligence rather than technological sophistication.

Human security lies at the centre of this proposition. For ordinary citizens, insecurity is rarely abstract. It concerns whether medicines are available, water remains safe, children attend school, disputes are resolved fairly, and livelihoods remain viable. Security is experienced through everyday routines rather than geopolitical language (UNDP, 1994). For this reason, SVN treats human security not as rhetoric but as organising principle. Communities gradually rebuild predictability around health, education, livelihoods, participation, water, and environmental stability. The objective is not perfection but reduced vulnerability.

- A functioning clinic.
- A predictable school.
- Reliable water.
- Fair mediation.
- Trusted information.
- Modest livelihood stability.

Together, such experiences generate something politically significant, confidence that institutions matter again.

Primary health care offers perhaps the clearest illustration of this logic. Properly understood, PHC is not simply a low-cost package for underserved populations. It functions as a connective infrastructure embedded within everyday life. Citizens encounter it repeatedly through childbirth, illness, disability, nutritional crises, vaccination, epidemic threats, and care-seeking. Trust accumulates incrementally through predictable interaction: respectful treatment, functioning referral systems, competent care, and reliable medicines. Such encounters shape political legitimacy as much as clinical outcomes (WHO, 1978). If SVN provides the operational grammar of recovery where people live, the Sudan National Recovery Framework provides its governing architecture. One concerns capability in everyday life; the other concerns coordination, redistribution, preparedness, standards, and coherence across scales. Recovery becomes durable only when these two dimensions reinforce rather than compete with one another.

It is to this wider governing architecture—the **Sudan National Recovery Framework (SNRF)**—that the discussion now turns.

The Sudan National Recovery Framework, Governance, Human Security, and the Reconstruction of Trust

If the Smart Village Network provides the operational grammar of recovery where people live, the Sudan National Recovery Framework (SNRF) addresses an equally important question: how should recovery be governed at scale? Sudan's geographical size, ecological diversity, uneven development, and fractured political history make this challenge unusually complex. Recovery must remain sufficiently local to reflect lived realities, yet sufficiently coordinated to prevent fragmentation, duplication, and renewed territorial inequality.

Sudan's political experience offers repeated warnings against simple institutional formulas. Administrative centralisation often promised coherence while deepening institutional distance from communities. Decentralisation, meanwhile, frequently devolved responsibility without adequate authority, financing, or technical capability. Neither tendency satisfactorily addressed longstanding disparities in education, health care, infrastructure, political representation, or regional investment (Mamdani, 1996; de Waal, 2015). The SNRF proposes a different organising logic:

Governance as coordination rather than command

Recovery already unfolds across multiple institutional levels. Schools operate locally but depend upon national standards, financing, teacher preparation, and curricular systems. Health services rely on community trust while simultaneously depending on supply chains, epidemiological intelligence, referral systems, infrastructure, and professional regulation. Agricultural livelihoods may begin locally but remain shaped by transport systems, ecological management, markets, and macroeconomic conditions. The difficulty emerges when these levels cease communicating. Communities recognise vulnerability quickly but often lack resources. Central institutions possess resources but frequently lack visibility. Recovery weakens when the relationship between the two becomes fragmented.

The SNRF responds by organising governance around distributed capability. Communities identify priorities and participate in implementation. Local institutions coordinate service delivery and adaptation. National systems provide redistribution, standards, financing, preparedness, infrastructure, and strategic direction. Authority therefore becomes layered rather than monopolised, reflecting polycentric approaches in which multiple centres of decision-making cooperate while retaining differentiated responsibilities (Ostrom, 1990).

This arrangement is not merely administrative. It is political. Citizens rarely trust institutions abstractly. Trust grows when governance becomes intelligible—when responsibilities are visible, responses predictable, and institutions capable of recognising everyday realities. Here, African traditions of consensual governance provide useful insight. Kwasi Wiredu argued that legitimacy in many African political traditions emerged less through adversarial competition than through deliberation and negotiated agreement (Wiredu, 1996). Sudanese local life has long reflected related traditions through village mediation, neighbourhood organisation, collective deliberation, and negotiated coexistence. Recovery therefore, benefits not from mechanically importing institutional models, but from building upon civic habits already embedded within social life.

Human security provides the normative centre of this architecture.

Conventional understandings of security privilege territorial defence and political order. Yet for populations emerging from prolonged conflict, insecurity is experienced through illness, displacement, interrupted schooling, unemployment, hunger, environmental decline, and institutional abandonment (UNDP, 1994).

- A child excluded from school experiences insecurity.
- A mother unable to access medicines experiences insecurity.
- A displaced household without livelihood, water, or administrative protection experiences insecurity.

Recovery becomes meaningful when such vulnerabilities begin to diminish.

For this reason, the SNRF treats human security not as a rhetorical aspiration but as an institutional doctrine. Governance becomes accountable not simply for preserving order, but for improving the predictability of ordinary life. Can children safely return to education? Can communities secure food, water, and care? Are maternal deaths declining? Can households rebuild livelihoods? Do citizens trust institutions again?

Such questions reveal the lived substance of governance more clearly than political slogans. Equity follows naturally from this perspective. Sudan's crisis unfolded unevenly across territory, reflecting deeper historical disparities in infrastructure, education, health access, economic opportunity, and political visibility. Such inequalities were not incidental; over time, they shaped experiences of exclusion and grievance. The danger after war is therefore obvious: Reconstruction may unintentionally reproduce the geography of neglect. Post-conflict investment frequently gravitates toward visible, accessible, or administratively stronger regions. Communities already disadvantaged risk remaining peripheral precisely when recovery matters most.

For this reason, the SNRF treats territorial equity not simply as an ethical aspiration but as practical stabilisation strategy. Allocation decisions should increasingly reflect displacement burden, educational interruption, health deprivation, ecological vulnerability, livelihood collapse, and infrastructure destruction. Fairness matters politically. Citizens rarely compare institutions against ideal standards alone; they compare them against neighbouring realities. Visible neglect deepens grievance. Visible fairness strengthens patience.

Health occupies a distinctive position within this framework because of its unusual capacity to connect systems too often treated separately. Health depends upon nutrition, transport, education, environmental conditions, communications, water systems, trust, and governance. Improvements in health, in turn, strengthen productivity, preparedness, educational continuity, and institutional legitimacy.

Primary health care, therefore, becomes strategically important. The principles articulated in the Declaration of Alma-Ata recognised health as inseparable from prevention, participation, equity, and intersectoral action (WHO, 1978). Sudan's own experience offers additional grounding. Community-oriented traditions associated with rural medicine and culturally embedded care—including the work of El Tigani El Mahi—demonstrated that legitimacy strengthens when care remains socially intelligible and territorially embedded.

Comparable lessons emerged from the Aro Village experiment associated with Thomas Adeoye Lambo, where psychiatric care proved more effective when integrated into social life rather than separated from it (Lambo, 1960). These examples reinforce a wider proposition: institutions become more resilient when socially embedded. A functioning clinic, therefore, communicates something quietly consequential: society still recognises obligation.

Citizens encounter institutions repeatedly through childbirth, illness,

vaccination, trauma, disability, nutritional crises, and care-seeking. Trust returns gradually through repetition—through respectful interaction, competent care, functioning referral pathways, and reliable medicines. Preparedness deepens this logic.

The epidemic intelligence chapter demonstrates persuasively that crises become catastrophic less because hazards emerge than because institutions fail to recognise vulnerability early enough. Disease surveillance depends not simply on laboratories, but upon communication systems, reporting pathways, mobility, trust, professional networks, and territorially grounded institutions. Prepared societies are not societies without crisis. They are societies capable of absorbing disruption with less devastation. Preparedness, therefore, becomes preventive governance: the capacity to recognise disease clusters before widespread transmission, nutritional deterioration before famine, educational disruption before permanent exclusion, or social tension before fragmentation.

Yet recovery after catastrophe also requires moral repair. War weakens trust, intensifies grievance, and unsettles expectations of fairness. Questions of justice, therefore, become unavoidable. Post-conflict debate often frames justice through misleading binaries: accountability versus peace, truth versus coexistence, reconciliation versus stability. Durable recovery rarely permits such simplicity. Accountability matters because impunity weakens legitimacy. Coexistence matters because fractured societies must continue living together. Institutional reform matters because repetition remains possible. Justice must therefore be understood broadly.

National mechanisms—truth processes, reparative frameworks, judicial accountability, and documentation systems—may prove important. Yet, everyday justice matters equally.

- Land disputes.
- Administrative grievance.
- Compensation claims.
- Inheritance disputes.
- Gender-based violence.
- Agricultural access.

For many citizens, governance becomes meaningful—or meaningless—through such encounters. A displaced family unable to reclaim land, a widow denied inheritance, or a grievance resolved unfairly experiences institutional failure regardless of national rhetoric.

Recovery, therefore, requires dispute-resolution systems that remain accessible, trusted, and intelligible. Formal institutions remain essential, yet community mediation and local mechanisms may also matter where compatible with fairness, accountability, and rights protections.

Land governance deserves particular attention because displacement

altered settlement, ownership, mobility, and belonging across much of Sudan. Return cannot simply be assumed. Property disputes, pastoral routes, compensation claims, and urban settlement patterns will remain politically sensitive. Durable solutions will require mediation, transparency, legal credibility, and patience rather than administrative haste.

Inclusion Forms Another Pillar of Legitimacy.

Sudan's recent crisis repeatedly demonstrated the indispensability of labour, too often rendered invisible. Women sustained households and reciprocal care systems. Young people organised relief. Teachers preserved continuity. Health workers maintained fragile institutions under extraordinary strain. Yet post-conflict governance frequently narrows participation rather than widening it.

- Recovery becomes stronger when institutions recognise capability wherever it exists.
- Young people require meaningful pathways into civic life.
- Women require institutional voice beyond symbolism.
- Professional networks, displaced communities, educators, and local organisations require visible inclusion.

Participation matters because institutions become recognisable only when citizens experience themselves within them. Knowledge systems reinforce this process.

Recovery depends not merely on institutions capable of governing, but on institutions capable of learning. Universities, archives, professional education, research systems, and public information networks become forms of civic infrastructure. Societies able to study themselves govern themselves more effectively. Knowledge sovereignty, in this sense, does not imply intellectual isolationism. Rather, it refers to institutional capability: the ability to generate evidence, preserve memory, interpret social realities, and shape policy through grounded understanding. Recovery becomes stronger when societies learn from collapse rather than merely surviving it. Yet governance, legitimacy, participation, and knowledge alone remain insufficient. Citizens must also experience material recovery. Livelihoods, infrastructure, distributive fairness, and economic opportunity remain indispensable foundations of stability. It is to those material foundations of renewal that the discussion now turns.

Political Economy, Institutional Learning, and the Renewal of the Social Contract

Institutional legitimacy, governance reform, and civic participation remain indispensable to recovery. Yet post-war societies ultimately confront a simpler and more immediate question: *How will people live?*

No recovery framework can sustain legitimacy if households remain unable to secure food, shelter, livelihoods, education, mobility, or health care. Citizens

rarely judge recovery through macroeconomic indicators alone. Rather, they evaluate institutions through ordinary experience: whether medicines become available, schools reopen, roads reconnect communities, markets function, and livelihoods again appear possible. Recovery, therefore, depends fundamentally upon political economy.

This concern extends beyond economic growth narrowly understood. Growth may coexist with territorial imbalance, exclusion, institutional fragility, and widening inequality. Post-conflict recovery succeeds less through aggregate output than through distributive legitimacy—that is, whether recovery becomes visible, equitable, and socially stabilising (North, 1990).

Sudan's recent history reinforces this lesson. Long before war intensified fragility, uneven territorial investment, weak rural infrastructure, ecological vulnerability, declining productive systems, and unstable relations between governance and livelihoods shaped everyday insecurity (de Waal, 2015). Conflict deepened these pressures through displacement, inflation, interrupted agricultural production, disrupted markets, weakened transport systems, and deteriorating public services.

The implication is straightforward. Recovery cannot simply restore previous arrangements and expect different outcomes. Livelihoods become central because they stabilise social life. Households unable to secure income struggle to invest in education, health, participation, or future planning. Economic insecurity narrows horizons and deepens frustration, particularly among young people confronting prolonged exclusion. Conversely, even modest material improvements can generate disproportionate social effects.

- Reliable agricultural production.
- Functioning local markets.
- Vocational opportunity.
- Women's economic participation.
- Youth employment.
- Small enterprise recovery.
- Improved transport.

Such changes influence not only income but confidence. Citizens participate more fully in institutions when futures begin to appear plausible again.

For this reason, Recovery from Below treats livelihoods not as secondary developmental concerns but as stabilising systems. Agriculture occupies particular importance because of its simultaneous relationship to economy, nutrition, ecology, migration, and social continuity. Across much of Sudan, agriculture remains more than a productive activity; it structures household life, local identity, and community organisation. Yet agricultural recovery requires systems thinking. Production alone is insufficient.

Food systems depend upon irrigation, veterinary care, transport, storage,

ecological stewardship, governance, market access, and local knowledge. Agricultural interventions disconnected from these wider systems rarely prove sustainable.

- Food insecurity seldom reflects scarcity alone.
- Transport disruption matters.
- Climate variability matters.
- Ecological degradation matters.
- Governance matters.
- Knowledge matters.

Here, African experience again offers useful insight. Community-centred traditions associated with Julius Nyerere emphasised that development depended not only on production but on collective capability, participation, and institutional ownership (Nyerere, 1968). Historical contexts differ, yet the underlying insight remains relevant: recovery becomes stronger when communities participate actively in development rather than receive it passively.

Environmental governance, therefore, cannot remain peripheral to reconstruction. Conflict intensified pressure upon forests, grazing systems, agricultural land, and water resources. Displacement altered settlement patterns and patterns of resource use, while drought, flooding, and climatic instability deepened vulnerability.

Resilient societies increasingly depend upon water stewardship, climate-sensitive agriculture, soil protection, ecological monitoring, renewable energy, and integrated approaches linking environmental, animal, and human wellbeing. Preparedness, in this sense, becomes inseparable from ecological resilience.

Infrastructure deserves similar reconsideration. Post-war discourse often privileges major projects: highways, industrial corridors, national energy systems, and transport networks. Such investments may ultimately prove important. Yet recovery frequently depends just as much upon quieter forms of infrastructure:

- roads reconnecting villages to clinics and markets;
- water systems reducing disease burden;
- communications enabling preparedness;
- electricity sustaining health services and livelihoods;
- transport restoring educational access.

Citizens experience infrastructure not merely as an engineering achievement, but as capability. Can care be reached? Can schools function? Can livelihoods resume? Can markets reconnect? Infrastructure reorganises possibility.

The question of financing naturally follows. Sudan's recovery will require resources from national institutions, humanitarian agencies, multilateral

organisations, universities, civil society, professional networks, philanthropic actors, private investment, and the diaspora. Yet reconstruction repeatedly falters when resources remain fragmented.

- Funding alone does not produce systems.
- Projects multiply.
- Coordination weakens.
- Communities experience duplication in one place and neglect in another.
- Administrative fatigue deepens.
- Institutional legitimacy suffers.

The challenge, therefore, concerns governance of recovery itself. Financing should increasingly strengthen systems rather than isolated interventions. A clinic becomes sustainable when linked to medicines, transport, referral systems, maternal care, trained personnel, water systems, and local accountability. Schools strengthen continuity when connected to psychosocial support, teacher retention, nutrition, and community participation. The objective is not bureaucratic density. It is coherence.

External assistance will remain indispensable, particularly during early recovery. Yet international partnerships strengthen reconstruction most effectively when they build institutional capability rather than indefinitely substitute for it. The issue is therefore not sovereignty versus cooperation. Rather, how can cooperation strengthen sovereignty? Part of the answer lies in rebuilding domestic capability.

No society remains permanently organised around emergency logic. Fiscal legitimacy matters because citizens contribute more willingly when institutions become visible, predictable, and fair. Functioning schools, reliable clinics, transparent governance, and accountable services transform taxation from extraction into contribution.

The Sudanese diaspora occupies a particularly important place within this transition. Throughout the crisis, diaspora communities sustained families, preserved professional continuity, transferred knowledge, mobilised advocacy, and supported humanitarian response. Yet diaspora contribution extends beyond remittances.

- Professional mentoring.
- Telemedicine.
- Academic collaboration.
- Village investment.
- Technical partnerships.
- Knowledge exchange.
- Institutional strengthening.

Such contributions become especially valuable when governance systems remain trusted and transparent.

Still, financing and institutional reform alone cannot rebuild legitimacy. Recovery ultimately concerns relationships between institutions and citizens; between knowledge and action; between participation and governance; between livelihoods and dignity. At its deepest level, Sudan's crisis represents a rupture in the social contract. Citizens repeatedly encountered insecurity, interrupted services, unequal treatment, and institutional absence. Trust weakened gradually long before collapse became visible. Its restoration will likely proceed gradually, too. Not dramatically. Through repetition.

- A functioning clinic.
- A reopened school.
- Reliable water.
- A fair local process.
- A grievance addressed.
- A livelihood restored.

Such encounters may appear ordinary, yet they accumulate politically. Citizens begin to expect institutions again. Recovery becomes believable.

Policy Box 1: Recovery as Architecture, Not Projects

Recovery should not be understood as a collection of disconnected interventions, however, necessary these may be. Durable reconstruction depends upon relationships between systems: health linked to water, education linked to livelihoods, preparedness linked to governance, and local capability linked to national coordination. Recovery succeeds when institutions reinforce one another and become socially embedded rather than episodic.

In this sense, recovery is architecture rather than accumulation.

Policy Box 2: Minimum Conditions for Recovery from Below

The minimum institutional foundations for sustainable recovery include:

- accessible primary health care;
- continuity of education;
- safe water and sanitation;
- livelihood and food security systems;
- functioning local governance and dispute resolution;
- preparedness and early warning systems;
- knowledge institutions capable of learning and adaptation.

Without these minimum foundations, recovery remains fragile and reversible.

This chapter has argued that reconstruction should not be understood merely as restoration. Restoration risks rebuilding fragility. Renewal asks more demanding questions: What failed? What endured? Which institutions retained trust? How might governance become more equitable, accountable, and socially embedded? How can recovery reduce the likelihood of repetition?

The Smart Village Network and Sudan National Recovery Framework offer responses not as rigid blueprints, but as organising architectures. The SVN concerns everyday capability: health, education, participation, preparedness, livelihoods, and local resilience. The SNRF concerns scale: coordination, redistribution, territorial equity, preparedness, and institutional coherence. Neither succeeds independently. Local resilience without coordination risks fragmentation. National planning without social legitimacy risks irrelevance. Recovery depends upon connection. Sudan's future will depend less upon the quantity of projects implemented than upon whether institutions become recognisably fair, useful, and present in everyday life. Health systems must regain trust. Education must restore continuity and civic confidence. Governance must become visible and accountable. Economic recovery must restore dignity. Knowledge systems must strengthen preparedness and institutional learning.

Recovery, in this sense, is cumulative. Societies rarely recover dramatically. They recover gradually.

- A child returns to school.
- A nurse becomes trusted again.
- A livelihood resumes.
- A village meeting becomes meaningful again.
- A displaced family regains security.

Such moments rarely attract headlines, yet they form the quiet architecture of legitimacy. Sudan is most likely to rebuild sustainably when recovery begins where life is lived, when institutions strengthen rather than overlook capacities surviving within communities, and when national systems coordinate rather than displace local resilience.

Recovery from Below, therefore, concludes with a proposition both practical and hopeful: Sudan's reconstruction will succeed not through restoration alone, but through the patient rebuilding of trust, dignity, institutional capability, and social coherence, so that catastrophe becomes not the defining horizon of political imagination, but the experience through which wiser and more resilient forms of national life emerge.

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CONCLUSION

Ahmed El Safi, Gerard McCann and Abdelbagi Ahmed

Rebuilding Sudan After Catastrophe: State Collapse, National Recovery, and the Architecture of Renewal is the product of an unprecedented intellectual, ethical, and civic undertaking. It represents the first coherent attempt to imagine Sudan after a period of catastrophic violence and systemic destruction—not retrospectively, not rhetorically, and not as an elite political exercise, but architecturally, empirically, and morally, while the catastrophe itself is still unfolding.

This volume, together with the Sudan National Recovery and Reconstruction Framework (SNRF) and the Smart Village Network (SVN), has been developed in collaboration with Sudanese and international scholars and professionals who share a singular conviction: that recovery is not the reward of peace, but its precondition, and that Sudan's future must be designed from the ground up, rooted in lived realities rather than imposed abstractions.

A First Vision After Catastrophe

This book is the first of its kind in Sudanese history. It brings together a collective of scholars and practitioners attempting to articulate a comprehensive recovery vision during an ongoing period of mass atrocity and institutional collapse, rather than after a negotiated settlement or elite political transition. The contributors did not wait for violence to subside in order to think responsibly about the future. Instead, they confront directly one of the most difficult intellectual and moral questions: what does it mean to rebuild a country after catastrophic violence, and how can that rebuilding be protected from recurrence?

The answers offered in this volume is neither rhetorical nor utopian. It is grounded in evidence, professional experience, and ethical clarity. Across its chapters, the book documents in detail the realities inflicted on Sudan's population: mass killing, displacement, the destruction of health and education systems, environmental devastation, and the systematic dismantling of civic life. These realities are not presented abstractly. They are supported by first-hand testimonies of witnesses and survivors, by professionals who lived and worked through the collapse, and by up-to-date data drawn from verified sources. The book is anchored in an extensive body of scholarly and policy literature across medicine, public health, economics, governance, law, environmental studies, anthropology, history, and political economy. This is not a book that merely records suffering. It is a book that confronts suffering in order to design recovery.

The Group Behind the Work

The contributors to this volume have been drawn from Sudan and the Sudanese diaspora, alongside international academic and professional communities closely

engaged with Sudan. They include university professors, clinicians, public health experts, engineers, economists, environmental scientists, historians, legal scholars, and policy practitioners. What unites them is not ideology or institutional affiliation, but a shared professional ethic and civic responsibility. Each chapter reflects deep expertise and lived engagement, often grounded in decades of work within Sudan's institutions and communities.

The chapters are not intended to be encyclopaedic. Rather, they are illustrative and strategic: they identify what is essential for recovery, which domains are non-negotiable, and why certain principles must guide any serious reconstruction effort. In this sense, the book does not attempt to say everything. It seeks to say what matters. A defining feature of this volume is its commitment to documenting mass atrocity and systemic destruction with clarity and restraint. The violence inflicted on Sudan is neither minimised nor sensationalised. It is recorded as historical fact, ethical evidence, and a foundation for accountability. Testimonies are treated not as anecdote but as structured forms of knowledge. Documentation is not presented as an end in itself, but as a necessary condition for prevention. The authors insist that recovery without truth risks reproducing the conditions of renewed violence.

The Smart Village Network and Recovery from Below

At the conceptual and practical core of this work lies the Smart Village Network (SVN). The SVN is not a development slogan or pilot intervention. It is a recognition of Sudan as it exists in reality, and a proposal to organise recovery accordingly. Sudan is composed of more than 6,000 villages, thousands of semi-village settlements, over 300 rural hospitals, and an extensive, though severely damaged, primary health care network and disparate education system. These realities have long been marginalised in national planning.

The SVN begins with a simple but transformative premise: Sudan lives from below, and recovery must therefore be built where people actually live.

"Starting from below" does not imply opposition to cities or the central state. On the contrary, the SVN is designed to strengthen national coherence by stabilising local systems. By restoring functionality at the village and district level, the state itself becomes capable of recovery. The SVN is locally grounded yet nationally integrated. It invites planners, engineers, and policymakers to contribute within a shared framework of recovery rooted in lived reality. One of the most rigorous dimensions of this volume is its treatment of health systems, particularly primary health care (PHC). Health is approached not as a sector, but as a social contract linking state, professionals, and communities. The analyses address underlying issues of governance and financing of PHC, human resources and professional ethics, community trust and access. With this the authors advocate progressive integration of the One Health approach.

Beyond this the book offers concrete, context-specific solutions. For example, it examines the safeguarding of traditional water systems (*hafirs*) from

environmental contamination, combining indigenous knowledge with modern scientific approaches.

This reflects the broader methodological principle of the volume: innovation grounded in Sudanese reality, rather than imported models.

A Philosophical Reorientation of Recovery

Beyond policy design, the book advances a rethinking of recovery as a moral and civic process. Reconstruction is not treated as a technical exercise alone, but as a transformation of institutions, values, and relationships. Recovery demands: grassroots democracy practiced at local levels; the cultivation of informed and ethically grounded citizens; the renewal of cultural heritage as a source of resilience; and institutional redesign to address inequality and exclusion. Returning to roots – development from below – is not framed as nostalgia, but as regeneration. It is about building forward from what has sustained society, networks and communities long neglected by formal systems.

What distinguishes this volume is its capacity to articulate an optimistic vision without denying the scale of devastation. It avoids both despair and empty rhetoric.

Instead, it offers a coherent and intelligible vision of recovery grounded in reality—one that Sudanese communities can recognise and participate in. This is not a book of promises. It is a book of possibility.

In keeping with its civic orientation, the book is designed for broad accessibility. It will be available in multiple formats and languages, including English and Arabic, and distributed across academic, policy, and public platforms. It is intended not only as a scholarly work, but as a tool for engagement—informing policymakers, supporting civil society, and enabling informed participation in recovery processes. Why does this book matter? This volume, together with the Sudanese National Recovery Framework (SNRF) and the Smart Village Network (SVN), represents the first integrated recovery architecture developed during a period of catastrophic violence. It is a synthesis of testimony, data, policy, and philosophy at national scale, a framework that names mass atrocity clearly while designing pathways beyond it. It is a recovery philosophy grounded in Sudanese social reality that does not ask Sudan to become something external or imposed. Essentially, it asks Sudan to recognise itself—and to rebuild deliberately, with clarity and purpose. As editors, we offer this book not as a final statement, but as a foundational invitation: to think honestly, to recover deliberately, and to refuse the normalisation of destruction.

APPENDIX

THE SMART VILLAGE NETWORK AND THE SUDAN NATIONAL RECOVERY FRAMEWORK

Ahmed El Safi

Introduction: Recovery as Re-Foundation of the State

Recovery is not a return. It is a re-foundation.

Sudan's present condition cannot be adequately understood through the conventional vocabulary of crisis or post-conflict recovery. What has occurred is not a temporary disruption within an otherwise functioning state, but a structural rupture affecting the institutional, economic, social, and epistemic foundations of collective life. The visible manifestations—destruction of infrastructure, mass displacement, and collapse of services—are accompanied by deeper transformations, including the erosion of institutional continuity, fragmentation of authority, weakening of economic coordination, and disconnection of knowledge systems from practice (Mamdani, 1996; North, 1990).

In many regions, what persists is not institutional absence but fragmented functionality. Partial systems continue to operate without coherence, while communities sustain essential functions through socially embedded structures grounded in trust, reciprocity, and shared norms (Scott, 1998; Granovetter, 1985).

This condition exposes a fundamental limitation in dominant reconstruction paradigms. Reconstruction presumes the restoration of a prior order. Yet the pre-collapse Sudanese state was neither stable nor equitable, but characterised by centralisation, uneven territorial governance, institutional fragility, and declining civic legitimacy (Paris, 2004; Fukuyama, 2011).

Recovery must therefore be understood as the reconfiguration of state-society relations on new institutional, social, and epistemic foundations. It requires not isolated repair, but the reconstruction of relationships—between centre and periphery, authority and legitimacy, and knowledge and practice.

This advances a unified recovery architecture grounded in this premise. It proposes an integrated system linking locally grounded functionality with national coordination. The SVN provides the operational foundation, while the SNRF establishes the structures through which these systems are aligned, coordinated, and sustained.

Together, they form a single recovery system—connecting local capacity to national coherence and enabling recovery as a structured, adaptive process rather than a fragmented set of interventions.

PART I - The Smart Village Network - An *Architecture for Post-Catastrophe Recovery*

1. Recovery Begins Where Society Endures

Recovery begins where society has not collapsed.

Despite widespread institutional breakdown, social systems in Sudan continue to function at the level of everyday life. Communities organise access to resources, mediate relationships, and sustain essential services through locally grounded structures. These systems are not formal institutions, yet they retain legitimacy and operational capacity under conditions of fragmentation.

This persistence defines the starting point of recovery. Where conventional approaches begin from the assumption of institutional absence, the Sudanese context reveals continuity within social systems. These systems provide the only viable foundation upon which reconstruction can proceed.

However, their continued operation does not imply systemic coherence. Health services may function without supply chains; governance structures may operate without coordination; markets may persist without infrastructure. What exists is functional activity without integration. Recovery must therefore move beyond sustaining isolated functions toward constructing coherent systems.

This requires a shift in analytical perspective. The central question is not how to restore institutions as they were, but how to reorganise existing capacities into integrated systems capable of sustained operation. Socially embedded structures must be treated not as temporary coping mechanisms, but as foundational components of system reconstruction.

Within the **SVN**, these structures are transformed into operational units of recovery. Village systems become sites where health, governance, economy, infrastructure, and knowledge are organised as interdependent functions. Integration is achieved not through administrative aggregation, but through functional relationships embedded in system operation.

This approach establishes a critical principle: recovery must be built from existing capacities rather than imposed through external design. Systems that emerge from socially embedded structures are more likely to sustain legitimacy, enable coordination, and support long-term stability.

At the same time, locally grounded systems cannot operate in isolation. Their effectiveness depends on connection to wider structures capable of coordination, resource distribution, and policy alignment. This necessity points toward the role of the **SNRF**, which extends local functionality into a coherent national process.

Recovery, therefore, begins locally, but cannot remain local. It must be constructed as a system that links socially embedded capacity with institutional coordination—ensuring that what endures becomes the foundation of what is rebuilt.

POLICY BOX 1 — GRASSROOTS GOVERNANCE AND CIVIC FOUNDATIONS

Legitimacy as the starting point of recovery

Effective recovery begins where authority is socially embedded, and legitimacy is locally produced.

- Community-based structures—village councils, neighbourhood committees, and informal networks—constitute the primary operational layer of governance under conditions of systemic collapse.
- Legitimacy is generated through proximity, participation, and trust; formal designation alone is insufficient to sustain authority in fragmented environments.
- Recovery interventions must operate through existing local governance systems, avoiding the creation of parallel structures that undermine coherence and accountability.
- Local governance structures should be progressively formalised through clear roles, procedures, and accountability mechanisms, while preserving their social embeddedness.
- Civic education enables communities to translate participation into effective governance by strengthening decision-making capacity, oversight, and collective responsibility.
- Inclusive representation—particularly of women, youth, and displaced populations—is essential to legitimacy and improves responsiveness and equity in decision-making.
- Safeguards are required to mitigate risks of local elite capture, exclusion, and informal power consolidation, including transparency measures and community-based oversight.
- Structured linkages between local and higher-level governance systems ensure coordination, resource alignment, and policy coherence.

When locally grounded legitimacy is combined with institutional structure and accountability, governance becomes both operationally effective and systemically sustainable.

2. From Fragmented Interventions to System Reconstruction

A central limitation of conventional recovery approaches lies in their reliance on fragmented, sectoral interventions. Health, education, water, governance, and livelihoods are typically addressed through separate programmes, funding streams, and institutional arrangements. While such interventions may generate short-term outputs, they rarely restore system functionality.

This fragmentation reflects an underlying assumption: that systems can be rebuilt incrementally through the accumulation of projects. In practice, systems do not emerge from aggregation. They depend on structured relationships—coordination, feedback, and interdependence across domains (North, 1990; Meadows, 2008). Where these relationships are absent, institutional forms may exist, but system performance remains weak.

The consequences are evident across post-collapse environments. Health facilities may be rehabilitated without reliable water or supply chains; schools may reopen without trained personnel or governance structures; livelihood programmes may generate income without integration into infrastructure or markets. Each intervention operates within its own logic, limiting the performance of the system as a whole.

In Sudan, these dynamics are reinforced by the structure of external assistance. Donor financing is organised around sectoral priorities, short funding cycles, and project-specific outputs. Implementation is often mediated through multiple layers of administration, generating duplication, delays, and high transaction costs. As a result, interventions remain externally driven and insufficiently embedded within local systems, weakening both effectiveness and sustainability.

The limitation is therefore not one of resources alone, but of design. Recovery organised as disconnected projects cannot produce coherent systems.

System reconstruction requires a shift from sectoral delivery to integrated design. Interventions must be conceived as interdependent components of a single operational structure, in which functionality depends on the alignment of domains rather than the performance of individual sectors (Checkland, 1999).

Within the **SVN**, this principle is operationalised at the level where recovery is implemented. Health systems are linked to water and sanitation; governance structures enable coordination and accountability; economic activity aligns with infrastructure and service provision; and knowledge systems inform continuous adaptation. Integration is not achieved administratively, but through functional linkages embedded in system operation.

This approach redefines recovery. Interventions are no longer discrete projects, but components of an interconnected system. The objective shifts from maximising sectoral outputs to restoring system performance.

Integration also enables feedback. Information generated within one domain informs action in others: health data guides governance decisions; economic activity supports service sustainability; community knowledge shapes implementation. This creates a dynamic system capable of learning and adaptation over time (Meadows, 2008).

The transition from fragmented intervention to system reconstruction is therefore both conceptual and operational. It requires redesigning how recovery is structured, financed, and implemented—and anchoring this process in socially embedded systems where integration can be realised in practice.

POLICY BOX 2 — PHC AS SYSTEM ANCHOR**Entry point for integrated system reconstruction**

PHC provides the most effective operational platform for rebuilding interconnected systems at the community level.

- PHC units function as core system nodes linking health, water and sanitation, nutrition, education, and local governance within a single operational space.
- Service delivery at PHC level must be designed as an integrated platform, where clinical care, prevention, public health, and community engagement operate as interdependent functions rather than separate activities.
- Routine data generated through PHC—covering disease patterns, nutrition, environmental risks, and service utilisation—must be systematically used to inform local decision-making, resource allocation, and higher-level coordination.
- PHC systems provide continuous interfaces between communities and institutions, reinforcing trust, enabling accountability, and ensuring responsiveness of services.
- Health events identified at PHC level should trigger coordinated multi-sector responses, activating governance, water and sanitation, and community mobilisation systems.
- Effective PHC requires alignment of key system inputs—trained personnel, supply chains, infrastructure, and governance structures—ensuring continuity and reliability of services.
- PHC platforms enable integration of formal and informal health actors, including community health workers and traditional practitioners, strengthening coverage and system reach.
- Structured linkages between PHC units and higher-level systems ensure that local data, priorities, and responses are connected to regional coordination and national policy.

When PHC functions as a system anchor, recovery shifts from isolated service delivery to integrated system performance grounded in community-level operation.

3. African and Sudanese Intellectual Lineage

The SVN is not an externally imposed construct; it emerges from a long-standing African intellectual tradition that situates governance, development, and social organisation within socially embedded systems rather than exclusively within centralised state structures.

Across African political thought, authority is understood as relational—produced through participation, legitimacy, and community life—rather than exercised solely through formal institutions. This orientation challenges state-centric models that treat institutions as autonomous from the societies they govern.

This perspective is reflected in key intellectual contributions. Julius Nyerere's concept of *Ujamaa* positioned the village as a unit of collective production and social organisation, linking economic life to social cohesion (Nyerere, 1968). Kwasi Wiredu advanced consensus-based governance grounded in deliberation rather than majoritarian competition (Wiredu, 1996). Claude Ake argued that development must be rooted in local agency and social structures rather than externally imposed institutional models (Ake, 1996). Similarly, Amílcar Cabral and Léopold Sédar Senghor emphasised the centrality of culture, identity, and historical experience in sustaining political systems (Cabral, 1973; Senghor, 1964).

These perspectives converge on a shared principle: institutional effectiveness depends on alignment with social realities. Where such alignment is absent, institutions may persist in form but fail in function.

Sudanese and Nigerian practice offers strong empirical grounding for this Smart Village Network. Tigani El Mahi's therapeutic village model, established in Umdubban, east of Khartoum North in 1950, integrated biomedical care with socially embedded support systems. In this model, he demonstrates that effective treatment could be organized within community structures without compromising clinical rigor (El Mahi, 1981). This model informed the work of Thomas Adeoye Lambo in Aro Village, Abeokuta, Nigeria, where community psychiatry advanced through the integration of clinical care with social reintegration, continuity, and active community participation (Lambo, 1964; Leighton, 1962).

The term "Smart Villages" has been used in different contexts, including the Smart Villages Initiative (2014–2017) led by John Holmes et al, which focused on energy access as a catalyst for rural development. The Smart Village Network work develops the concept independently from earlier African traditions of "therapeutic villages", including the initiatives of El Mahi and Lambo, extending it into a systems-based recovery architecture (El Safi, 1970; El Safi, 1999; El Safi, 2023; El Safi, 2024) –present).

These experiences demonstrate that socially embedded systems are not only normatively desirable but operationally effective. They show that integration across domains—health, social organisation, and governance—can be achieved when institutional design aligns with social context.

The SVN consolidates and extends this intellectual and practical lineage. It translates these principles into a systems architecture in which health, governance, economy, infrastructure, and knowledge are integrated within a single operational framework (El Safi, 2024). What earlier contributions articulated in philosophical or sectoral terms is here organised as an interdependent system capable of replication and scale.

In this sense, the **SVN** does not depart from African and Sudanese traditions. It operationalises them—transforming historically grounded insights into a structured model of system reconstruction and linking them to a governing architecture through the **SNRF**.

4. PHC as the Anchor of System Reconstruction

Primary Health Care (PHC) occupies a central role within the **SVN**—not as one sector among others, but as the operational anchor through which system reconstruction becomes actionable. Sudan’s historical engagement with PHC, particularly following the World Health Organization-led Alma-Ata framework, provides an established foundation for this role. The 1978 Alma-Ata Declaration (WHO, 1978) positioned PHC as the key to achieving “Health for All,” emphasising equity, community participation, and system integration rather than hospital-centred care.

The significance of PHC lies in its position at the intersection of system domains. Health outcomes depend on water, sanitation, nutrition, and environmental conditions; economic productivity depends on population health; and governance legitimacy is reinforced through the delivery of essential services. These interdependencies position PHC as both an entry point and a coordinating node within a wider system.

Within the **SVN**, PHC is reconceptualised as a multi-functional platform with interconnected roles. It serves as the primary site of service delivery, maintaining continuous engagement with the population. It operates as a system observatory, generating routine data on disease patterns, nutritional status, environmental risks, and service utilisation. It functions as an interface between communities and institutions, reinforcing trust and enabling accountability. It also acts as a coordination trigger, where identified health events initiate responses across related domains, including water, sanitation, and community mobilisation.

This functional integration shifts PHC from a clinical service to a system mechanism. Data generated at PHC level informs governance decisions; health events activate multi-sector responses; and routine service delivery reinforces institutional legitimacy. PHC thus becomes the point at which service provision, information flows, and governance processes converge. (El Safi, 2006a; El Safi, 2006b)

Global evidence supports this integrative role. PHC is defined as essential, community-based care that is universally accessible, socially acceptable, and grounded in participation and affordability. Systems organised around PHC are associated with improved outcomes, greater equity, and stronger resilience, particularly when linked to broader social determinants of health.

Empirical experience reinforces this logic. Ethiopia’s Health Extension Programme demonstrates how community-based PHC, when embedded within structured systems, can achieve scale while maintaining local responsiveness.

Evidence from Sudan reflects similar dynamics. In Wad Ballal (Gezira State), a functioning PHC unit coordinates vaccination campaigns, monitors child nutrition, and provides early warning of disease outbreaks. During seasonal flooding, it becomes a focal point for emergency coordination, linking health surveillance with water safety measures and community mobilisation. These examples illustrate how PHC can operate as a system node integrating service delivery, data generation, and coordinated response.

Within the **SVN**, this role is formalised and extended. PHC units are positioned as institutional hubs through which integrated systems are organised, monitored, and adapted. They provide a continuous interface between households and broader system structures, enabling both service delivery and coordination of interdependent functions.

PHC, therefore, constitutes the operational gateway to system reconstruction. Anchoring integration at the level where communities interact with services enables recovery to proceed as a coordinated system rather than a collection of sectoral interventions.

POLICY BOX 3 — POLYCENTRIC GOVERNANCE AND MULTI-LEVEL COORDINATION

Aligning local legitimacy with national coherence

Recovery requires governance systems in which authority is distributed across levels, functionally differentiated, and operationally aligned.

- Governance must operate across interconnected levels—local, regional, and national—with clearly defined roles and decision-making responsibilities at each level.
- Local governance systems provide legitimacy, contextual knowledge, service coordination, and direct accountability to communities.
- Regional structures coordinate across local systems, support planning and resource distribution, and adapt national frameworks to diverse contexts.
- National institutions establish policy, standards, and regulatory frameworks, ensure equitable resource allocation, and coordinate engagement with external actors.
- Effective governance depends on structured flows: information moves upward from local systems to inform decision-making, while resources, standards, and policy guidance flow downward to support implementation.
- Accountability operates through both institutional mechanisms (formal oversight, regulation) and social processes (community participation and monitoring), reinforcing transparency and responsiveness.
- External actors, including donors and NGOs, must align with national and local governance structures and avoid creating parallel systems that fragment authority and undermine coherence.
- Governance design must incorporate safeguards against over-centralisation, local elite capture, and institutional fragmentation through transparency, role clarity, and distributed oversight.

When governance is polycentric and coordinated, local legitimacy and national authority are integrated into a coherent system capable of sustaining recovery, equity, and long-term stability.

5. Knowledge Sovereignty as Foundational Infrastructure

Recovery requires the restoration not only of institutions and services, but of the capacity to generate, organise, and apply knowledge as a core system function. Under conditions of systemic collapse, knowledge systems fragment, become externally dependent, and detach from practice, weakening governance, decision-

making, and overall system performance (El Safi, 1999; North, 1990).

Within the **SNRF**, knowledge sovereignty is positioned as a foundational pillar of recovery. It refers to the capacity of institutions and communities to define, produce, and apply knowledge in alignment with local realities. This does not imply isolation from global knowledge systems; rather, it establishes a rebalanced epistemic order in which local knowledge, historical experience, and scientific practice are integrated. At its core, knowledge sovereignty reflects the ability of a society to control and sustain its own knowledge systems while engaging selectively with external sources.

The Sudanese context reflects a structural deficit in this domain. Professional training is often disconnected from community realities; research agendas are frequently externally driven; and indigenous knowledge systems—despite their continued operational relevance—remain marginalised. This misalignment creates a persistent gap between formal institutions and lived systems of practice, reducing both effectiveness and legitimacy (El Safi, 1999).

The **SVN** addresses this deficit by embedding knowledge as infrastructure within a multi-level system. At the community level, locally grounded knowledge—covering epidemiological patterns, environmental conditions, and social practices—is integrated into surveillance, preparedness, and response. These represent historically accumulated systems through which communities have long managed risk.

At the institutional level, knowledge is generated through system operation. PHC units, governance structures, and economic systems function as continuous learning nodes, producing real-time data that informs decision-making and adaptation. Knowledge is therefore not external to the system, but produced within it.

At the national level, the **SNRF** establishes mechanisms for the retention, organisation, and application of knowledge. Archival systems, professional records, and scientific outputs are treated as active resources for policy formation, planning, and institutional continuity. This includes the systematic documentation of Sudanese medical heritage and intellectual production, which functions as a strategic asset for recovery and long-term development (El Safi, 2012).

This multi-level integration creates a continuous feedback system linking practice, learning, and policy. It addresses a recurrent failure in post-conflict recovery: the separation of knowledge production from implementation. Where knowledge is externally generated and locally applied without contextual integration, systems lack both sustainability and legitimacy.

At the human level, this epistemic system is carried by the Al-Hakim professional framework. These practitioners integrate technical competence, cultural intelligence, ethical grounding, and systems thinking, enabling translation of knowledge across levels and effective application within diverse contexts (El Safi, 2006).

Knowledge sovereignty thus functions as operational infrastructure. It links local experience with institutional systems and national policy, ensuring that recovery is informed by continuous learning rather than external prescription.

Recovery, in this sense, is material and institutional. It is epistemic: the reconstruction of the capacity to know, to learn, and to act upon knowledge as a coherent system.

6. Governance and Embedded Legitimacy

Governance in contexts of systemic collapse cannot be understood as the restoration of formal authority alone. Where institutions fragment, authority is redistributed across socially embedded structures. The central challenge of recovery is therefore not simply to rebuild institutions, but to realign authority with legitimacy.

In Sudan, centralised governance has long coexisted with under-recognised local systems of decision-making, resource management, and dispute resolution. Under conditions of collapse, this imbalance becomes more pronounced: formal structures lose coherence, while locally embedded systems continue to operate. Village councils, neighbourhood committees, and customary authorities maintain functional roles in coordinating resources, mediating disputes, and organising collective action.

These systems derive authority from proximity, participation, and social trust rather than formal designation. Their legitimacy is therefore resilient, but their capacity is often constrained by lack of formal recognition, resources, and institutional linkage. Conversely, formal governance structures retain nominal authority but frequently lack operational legitimacy. This misalignment weakens both governance effectiveness and public trust.

Recovery requires the integration of these dimensions. Within the **SVN**, governance is structured as an embedded system in which local legitimacy forms the foundation of authority, while higher-level institutions provide coordination, standards, and resource flows (Ostrom, 2010). Authority is thus distributed across levels but functionally aligned through defined roles, information flows, and accountability mechanisms.

This alignment is not automatic. Without safeguards, locally embedded systems may reproduce exclusion, reinforce informal hierarchies, or become subject to elite capture. Similarly, centralised systems may reassert control in ways that undermine local legitimacy. Effective governance design must therefore incorporate transparency, role clarity, and mechanisms of oversight at multiple levels.

Operationally, embedded governance functions through structured relationships. Local systems generate information, coordinate service delivery, and provide direct accountability. Regional and national systems translate this information into policy, allocate resources, and establish regulatory frameworks. Feedback mechanisms ensure that decisions remain responsive to local conditions while maintaining system coherence.

Within this architecture, the role of the state is redefined. Rather than acting as a centralised provider of services, it functions as a coordinating and enabling structure—aligning distributed systems, ensuring equity, and maintaining standards. Its effectiveness depends not on central control, but on its capacity to support and integrate locally grounded systems.

Embedded governance thus provides the institutional logic through which the **SVN** scales into the **SNRF**. By aligning legitimacy with authority and linking local systems to national coordination, it establishes the conditions for governance that is both functional and sustainable.

POLICY BOX 4 — WOMEN AND YOUTH AS SYSTEM AGENTS

Human infrastructure of recovery

Women and youth constitute core operational components of system functionality in contexts of collapse and recovery.

- Women and youth perform essential system functions across domains, including health service delivery, household-level care, food systems, community coordination, and local economic activity.
- Recovery systems must formalise these roles within governance, service delivery, and economic structures, moving from informal reliance to defined institutional integration.
- Representation in local governance bodies must be structured and substantive, ensuring participation in decision-making, resource allocation, and oversight processes.
- System effectiveness depends on linking women and youth directly to operational platforms, including PHC units, local governance structures, and livelihood systems.
- Training and capacity development must be function-specific, aligned with defined system roles such as service delivery, data collection, coordination, and system monitoring.
- Economic participation of women and youth strengthens local resource circulation, stabilises livelihoods, and supports the sustainability of services.
- Governance systems must address structural barriers to participation, including exclusion, informal power hierarchies, and token representation, through transparency and accountability mechanisms.
- Integration of women and youth into knowledge systems—including data generation, communication, and local learning processes—enhances system adaptability and responsiveness.

When women and youth are structurally integrated as system agents, recovery gains operational capacity, improves coordination, and strengthens the sustainability of system performance.

7. Women and Youth as Agents of Systemic Recovery

Women and youth play a central role in sustaining system functionality under conditions of institutional collapse. As formal structures weaken, essential functions shift toward socially embedded actors who maintain continuity across domains of everyday life. In Sudan, this redistribution of roles is particularly visible in health systems, community organisations, and local coordination.

Women sustain critical system functions at the household and community levels. They are central to caregiving, informal health provision, food systems, and social support networks, particularly in contexts of displacement and service disruption. These roles are not ancillary; they form the operational base through which health outcomes, social cohesion, and household-level resilience are maintained. Their continuity ensures that system functions persist even when formal service delivery is compromised.

Youth operate as key agents of coordination and communication, particularly in urban and peri-urban settings. Neighbourhood committees, volunteer networks, and digital platforms are largely driven by youth participation, enabling the organisation of resources, dissemination of information, and mobilisation of collective action. These functions become critical in environments where formal administrative systems are absent or fragmented.

The significance of these roles lies in their contribution to system performance. In health systems, women and youth link households to PHC platforms, enabling early detection of health risks, continuity of care, and communication between communities and service providers. In governance, their participation enhances responsiveness, expands representation, and strengthens accountability. In economic systems, their engagement supports local production, labour availability, and the circulation of resources. In knowledge systems, they contribute to data generation, communication, and adaptive learning processes.

Excluding these actors from recovery frameworks reduces system effectiveness. Informal reliance without formal integration creates structural weaknesses: roles remain unsupported, accountability is limited, and system performance becomes dependent on unrecognised labour. Moreover, existing social hierarchies and barriers—such as gendered exclusion, limited access to decision-making, and unequal resource distribution—can constrain participation and reduce overall system capacity.

Within the *SVN*, women and youth are therefore positioned as system agents rather than beneficiaries. Their roles are linked to operational platforms—PHC units, governance structures, livelihood systems, and knowledge networks—through defined functions and responsibilities. This integration enables their contributions to be sustained, coordinated, and aligned with broader system objectives.

The integration of women and youth strengthens system resilience. It expands operational capacity, improves coordination across domains, and enhances the adaptability of systems under conditions of uncertainty. By embedding these

actors within institutional structures while preserving their social embeddedness, recovery systems gain both continuity and scalability.

Women and youth thus constitute essential components of system architecture. Their structured inclusion transforms recovery from a process dependent on informal coping mechanisms into a coordinated system capable of sustaining performance and long-term stability.

POLICY BOX 5 — MEASUREMENT AS GOVERNANCE (SVCI)

Linking data, decision-making, and system performance

Measurement becomes effective when it is embedded within system operation and directly drives governance decisions.

- The Smart Village Composite Index (SVCI) measures performance across interconnected domains—health, governance, economy, infrastructure, and knowledge—capturing system functionality rather than isolated outputs.
- Indicators must reflect relationships between domains, enabling assessment of how system components interact and perform collectively.
- Data is generated through routine system activities, including PHC records, governance processes, and community reporting, ensuring continuous and locally grounded measurement.
- Measurement must directly inform decision-making at the local level, guiding prioritisation, resource allocation, and coordination of interventions.
- Aggregated data enables regional coordination and national policy alignment, linking local system performance to higher-level governance.
- Transparency of data and indicators supports accountability, enabling communities and institutions to monitor performance and enforce oversight.
- Regular measurement establishes feedback loops, allowing systems to detect risks, evaluate interventions, and adapt in response to changing conditions.
- Measurement systems must remain simple, reliable, and usable in low-resource settings to ensure integration into everyday system operation.

When measurement is embedded as a governance function, systems become adaptive, accountable, and capable of sustaining performance under changing conditions.

8. Civic Education as Social Infrastructure for System Recovery

Civic education, within El Safi's framework, is not confined to moral instruction or general awareness. It functions as a form of social infrastructure—a system-enabling capacity that supports governance, coordination, and sustainability in contexts of systemic collapse (El Safi, 2006).

In Sudan's current condition, recovery cannot rely solely on the reconstruction of physical infrastructure or administrative systems. It depends equally on the presence of citizens capable of sustaining these systems through participation, accountability, and collective action. Civic education, therefore, operates at the level of system functionality: it equips individuals and communities with the competencies required to make governance and service systems work in practice.

Within the **SVN**, civic education is embedded in everyday institutional processes. Local governance structures—village councils, neighbourhood committees, and community organisations—derive legitimacy from participation. However, participation alone does not produce effective governance. It must be structured, informed, and oriented toward collective decision-making. Civic education enables this transition by strengthening the capacity for deliberation, role clarity, and oversight.

This function is central to system integration. The **SVN** operates through the interdependence of domains—health, governance, economy, infrastructure, and knowledge. Civic education fosters understanding of these interconnections, enabling coordinated responses rather than isolated actions. For example, public health outcomes depend not only on clinical services, but on collective practices related to sanitation, nutrition, and environmental management. When communities understand these relationships, system responses become integrated rather than fragmented.

Civic education also contributes to adaptive capacity. Recovery environments are characterised by uncertainty, evolving risks, and incomplete information. Systems must therefore learn continuously. Civic education strengthens the ability of communities to interpret information, adjust practices, and participate in collective problem-solving. In this sense, it functions as an embedded mechanism of system intelligence, complementing the knowledge infrastructure described within the **SNRF**.

At the national level, civic education supports institutional coherence. By embedding shared norms, responsibilities, and expectations across diverse regions, it enables governance systems to operate through alignment rather than imposition. Citizens capable of engaging with institutions, interpreting policy, and exercising accountability become active components of governance rather than passive recipients.

Within the **SNRF**, civic education acts as a linking mechanism between local legitimacy and national coordination. The **SVN** provides operational functionality at the community level; the **SNRF** provides the structures through

which these systems are aligned and sustained. Civic education ensures that participation at the local level translates into effective governance within this multi-level system.

The Murshid (مُرشد) framework provides a practical basis for this process. Its emphasis on applied learning, cultural grounding, and organisational practice enables civic education to function across contexts. Through structured engagement—awareness-building, leadership development, and collective action—it translates abstract principles into operational capacity.

Civic education is therefore not ancillary to recovery. It is a functional requirement. Infrastructure enables systems to operate, governance structures organise authority, but civic capacity sustains both. Without it, systems remain fragile; with it, they become coordinated, adaptive, and resilient. **Recovery, in this sense, is not only the reconstruction of systems. It is the development of the civic capacity required to sustain them.**

9. Integrated Systems at the Village Level

Recovery requires a clear definition of what must exist, function, and be sustained at the local level. The Minimum Smart Village Package (MSVP) provides this definition. It establishes the essential components that enable a village to operate as a viable, dignified, and resilient system. The MSVP is not a list of aspirations, but a functional baseline—defining the minimum conditions under which recovery can begin and be maintained.

At its core, the MSVP integrates a limited number of domains that are indispensable to system functionality: primary health care, safe water and sanitation, basic energy, local governance, a minimal economic platform, and a knowledge interface. These are not treated as separate sectors but as interdependent components of a single system. Each domain is defined not only by its presence, but by its capacity to function reliably and in coordination with others.

Primary health care forms a central pillar of the package. A basic facility, supported by trained personnel and community health workers, provides essential services—preventive, promotive, and curative. Its effectiveness depends on the presence of water, energy, and supply chains, illustrating the integrated nature of the system. Health is thus both a domain and an indicator of overall system performance.

Water and sanitation are foundational. Access to safe water and basic sanitation is a precondition for health, dignity, and social stability. The MSVP prioritises simple, maintainable systems that can be operated locally, ensuring continuity and reducing dependency on external intervention. Reliability of supply is treated as a core performance criterion.

Energy, preferably solar based, provides the enabling infrastructure for all other functions. It supports health services, water systems, communication, and small-scale economic activity. The emphasis is on decentralised, sustainable

solutions that can be maintained within the village, reducing vulnerability to external disruptions.

Local governance is embedded within the package as an operational component. Village-level structures are responsible for coordination, decision-making, and accountability across domains. Their legitimacy depends on representation, transparency, and the capacity to manage resources and resolve conflicts. Governance is thus integrated into the functioning of the system rather than positioned above it.

A minimal economic platform is included to support livelihoods and reduce dependency. This may involve small-scale agriculture, local markets, or micro-enterprises, depending on context. The objective is not immediate economic transformation, but the establishment of basic economic activity that sustains households and supports system continuity.

The knowledge interface links local practice to wider systems of learning and information. Village knowledge hubs provide access to educational resources, documentation, and communication tools, enabling the circulation of knowledge between local and national levels. This supports adaptation, innovation, and institutional memory.

The MSVP is designed to be both standardised and adaptable. Its core components remain constant, ensuring coherence across the network, while their specific configuration can be adjusted to local conditions. This balance allows for replication without rigidity, enabling the system to scale while remaining context sensitive.

Importantly, the MSVP defines not only what is required, but what is sufficient to initiate recovery. By establishing a clear operational baseline, it prevents the dilution of effort across excessive or poorly prioritised interventions. It also provides a concrete target for planning, financing, and measurement, linking directly to the Smart Village Composite Index and the broader governance structure of the **SNRF**.

Through the MSVP, recovery is grounded in a tangible and achievable configuration of systems. It translates the abstract concept of integrated recovery into a defined operational core, ensuring that each village within the network possesses the minimum capacity to function, adapt, and contribute to the wider process of national reconstruction.

10. Integrated Systems at the Village Level

Post-conflict recovery efforts often fail not because of lack of resources or technical knowledge, but because they are organised as fragmented sectoral interventions. Health, water, education, livelihoods, and governance are addressed as separate domains, each with its own actors, funding streams, and reporting systems. This fragmentation produces visible outputs but weak overall functionality. Services may exist, yet systems do not work.

The **SVN** addresses this problem by shifting the focus from sectoral delivery to integrated system performance. It treats the village not as a collection of projects, but as a functioning system in which multiple components interact. Health outcomes depend on water and sanitation; livelihoods depend on energy and infrastructure; governance shapes all domains. The effectiveness of each component is therefore determined by its relationship to others.

Integration within the **SVN** is both structural and functional. Structurally, core components—primary health care, water systems, energy, governance, local economy, and knowledge—are established together as part of the Minimum Smart Village Package. Functionally, these components are designed to operate in coordination, with defined interfaces and shared objectives. This ensures that services reinforce one another rather than compete or operate in isolation.

A critical aspect of this integration is the management of flows—of people, information, resources, and services. Systems are sustained not by static assets but by continuous, reliable flows. Clean water must reach households; medicines must reach patients; information must circulate between providers and decision-makers. The **SVN** emphasises the design and maintenance of these flows, recognising them as the determinants of system performance.

Governance plays a central role in integration. Local governance structures are not confined to administrative functions but are responsible for coordinating system components, resolving conflicts, and ensuring accountability. By embedding governance within the operational system, the **SVN** avoids the separation between decision-making and implementation that often undermines recovery efforts.

The integration of knowledge is equally important. Local knowledge, professional expertise, and institutional memory are brought together through village knowledge hubs and linked to national systems. This enables continuous learning and adaptation, ensuring that the system evolves in response to experience rather than remaining fixed.

Integration also extends to measurement. The Smart Village Composite Index captures performance across domains, allowing the system to be assessed as a whole rather than through isolated indicators. This reinforces the shift from outputs to functionality and provides a basis for coordinated improvement.

Importantly, integration does not imply complexity beyond manageability. The **SVN** is designed to be modular, with clearly defined components and interfaces. This allows for replication and scaling without losing coherence. Each village operates as a complete system yet remains connected to others through shared standards and feedback mechanisms.

Through this integrated approach, the **SVN** redefines recovery as system construction rather than sectoral repair. It moves beyond the accumulation of projects to the creation of functional relationships. In doing so, it establishes the conditions for sustainability, resilience, and scalability, forming the operational foundation upon which the broader architecture of the **SNRF** can be built.

POLICY BOX 6 — SYSTEMS ENGINEERING FOR RECOVERY*Designing for resilience, integration, and scale*

Recovery systems must be deliberately designed to function under conditions of fragility, uncertainty, and constraint.

- Systems should be modular, allowing components to function independently while remaining integrated.
- Integration must be achieved through functional linkages, not administrative aggregation of sectors.
- Redundancy should be built into critical functions to maintain continuity under stress.
- Feedback mechanisms must connect performance data to continuous system adaptation.
- Design should prioritise functionality over form, focusing on how systems operate rather than how they are structured.
- Systems must be scalable, enabling replication across diverse contexts without loss of coherence.
- Incremental implementation allows systems to evolve with available capacity and resources.
-

When recovery is engineered as a system rather than assembled as projects, it becomes resilient, adaptive, and sustainable

Ultimately, this approach affirms that sustainable recovery emerges not from isolated actions, but from the deliberate construction of interconnected systems.

11. Measurement and Adaptive Governance: The Smart Village Composite Index (SVCI)

No recovery system can function without a disciplined mechanism for measurement and feedback. The Smart Village Composite Index (SVCI) provides this function within the **SVN**, translating complex system performance into a structured set of indicators that enable monitoring, comparison, and continuous adjustment. It is not an external evaluation tool, but an integral component of system operation, linking local functionality to national governance.

The SVCI is designed to capture performance across the core domains of the Smart Village: health, water and sanitation, energy, livelihoods, governance, and knowledge. Each domain is represented by a limited set of indicators that reflect functional capacity rather than sectoral outputs. The emphasis is on how systems work—continuity of services, reliability of flows, responsiveness of governance—

rather than on isolated achievements. This ensures that measurement reflects system integrity rather than fragmented success.

At the village level, data collection is embedded in routine operations. Health workers, local governance structures, and service providers generate data as part of their daily functions. This reduces the need for parallel monitoring systems and ensures that data is grounded in practice. Standardised formats and simple reporting tools allow for consistency across villages while remaining adaptable to local conditions.

The aggregation of data follows a structured pathway. Village-level indicators are compiled into locality and state-level summaries, which in turn feed into national dashboards. This creates a continuous flow of information from the operational level to the strategic level. Importantly, this flow is bidirectional. National analysis informs local adjustments, while local data shapes national policy. The SVCI thus enables governance to function as a learning system rather than a static hierarchy.

A key feature of the SVCI is its composite structure. Indicators are not considered in isolation but are integrated into a single index that reflects overall system performance. This allows for comparison across villages and regions, identification of gaps, and prioritisation of interventions. At the same time, the index can be disaggregated to reveal domain-specific weaknesses, ensuring that detail is not lost within aggregation.

The SVCI also serves as a basis for accountability. Performance data is made accessible to communities, local authorities, and national institutions. This transparency enables informed participation and strengthens trust in the system. It also provides an objective basis for decision-making, reducing the influence of arbitrary or politically driven allocation of resources.

In the context of financing, the SVCI underpins performance-based allocation. Villages and localities that demonstrate effective system integration and measurable improvement are prioritised for continued or increased support. This creates incentives for functionality and encourages local actors to engage actively in system improvement. The index thus links measurement directly to resource flows, reinforcing the alignment between performance and support.

The SVCI is also a tool for resilience. By tracking trends over time, it enables early identification of system stress—declines in service continuity, governance failures, or resource shortages. This allows for timely intervention before problems escalate into crises. In this sense, the index functions not only as a measure of performance but as an instrument of preparedness.

Importantly, the SVCI is not static. Indicators and thresholds are subject to periodic review, allowing the system to adapt to changing conditions and emerging priorities. This flexibility ensures that measurement remains relevant and that the system can evolve without losing coherence.

Through the SVCI, the **SVN** embeds measurement within its operational

logic. It transforms data from a retrospective record into a forward-looking tool for governance and adaptation. By linking local realities to national oversight, and performance to decision-making, the SVCI enables the **SVN–SNRF** system to function as an integrated, responsive, and continuously improving architecture of recovery.

12. Financing Recovery: From Fragmented Aid to Structured Resource Flows

The sustainability of the **SVN** depends on the alignment of financial and material flows with system functionality. Financing is therefore not treated as an external input, but as an integral component of system operation—structured to sustain integration, reinforce performance, and ensure continuity across domains. In contrast to fragmented project-based funding, the **SVN** requires a financing architecture that mirrors system logic: coordinated, transparent, and functionally directed.

At the village level, financing is organised around the Minimum Smart Village Package (MSVP), which defines the essential components required to sustain life, dignity, and preparedness—primary health care, safe water and sanitation, basic energy, local governance capacity, and a minimal economic platform. Financial flows are tied to these functions rather than abstract budget lines, ensuring that resources directly support operational capacity and reducing leakage and misalignment.

The structure of financing is multi-layered. National funds provide strategic direction and macro-level stability, while state and locality allocations translate priorities into regionally appropriate investments. At the village level, funds are channelled through designated operational windows linked to specific functions and governed transparently. This structure enables coordination without sacrificing local flexibility.

A central innovation is the concept of the “window”—defined financial channels linked to domains such as health, water, energy, livelihoods, and governance. Each window operates with clear rules, indicators, and reporting requirements. This allows public, private, and diaspora contributions to flow into a unified system without creating parallel mechanisms, ensuring coherence and reducing fragmentation.

The diaspora window is particularly significant. It provides a structured pathway for engagement that is accountable and outcome linked. Rather than informal remittances, diaspora contributions are integrated into the system through transparent channels aligned with national priorities, transforming episodic support into a sustained recovery resource.

Transparency is embedded throughout. Financial flows are documented, publicly reported, and subject to audit. Village-level governance structures maintain visible records of decisions and expenditures, enabling community oversight, while higher levels use standardised reporting systems to ensure

accountability and comparability. Transparency is thus a functional requirement for trust and system integrity.

Performance-based allocation further strengthens the system. Funding is increasingly linked to system performance as measured by the Smart Village Composite Index, creating incentives for effective service integration, accountable governance, and measurable outcomes. This reinforces feedback loops and supports adaptive system learning.

The financing architecture also incorporates resilience. Contingency mechanisms, financial buffers, and flexible allocation allow the system to absorb shocks without disrupting core functions. External funding is accommodated but channelled through structured mechanisms, ensuring that it strengthens rather than fragments the system.

Finally, financing is tightly coupled with governance. Financial authority is linked to defined responsibilities, and accountability mechanisms ensure alignment with system objectives. In this sense, financing acts as a regulatory instrument—directing flows, reinforcing priorities, and enabling adaptation.

By aligning resources with function, the SVN transforms financing from a constraint into an enabling mechanism. It provides the material foundation for sustained recovery and supports the coherent scaling of the system through the SNRF.

PART II — THE SUDAN NATIONAL RECOVERY FRAMEWORK (SNRF)

A Governing Architecture for National Recovery

13. The SNRF: A Governing Architecture

If the SVN defines how recovery begins, the Sudan National Recovery and Reconstruction Framework defines how it is sustained, governed, and scaled. The SNRF is not a parallel structure to the SVN, nor a conventional national plan. It is the governing architecture that enables locally grounded recovery systems to expand into a coherent national order. Its central function is to align authority, resources, knowledge, and accountability across levels, ensuring that recovery is not fragmented, captured, or reversed.

At its core, the SNRF addresses a structural problem that has historically undermined recovery efforts in Sudan and elsewhere: the disconnection between local realities and national governance. In many post-conflict settings, national frameworks are designed as abstract policy instruments, while local systems struggle to function in isolation. The result is a dual failure—central plans that do not translate into practice, and local initiatives that cannot scale or sustain themselves. The SNRF resolves this by treating local systems not as beneficiaries of policy, but as the foundational units of the national system.

Federal Reconfiguration and the Centre–Periphery Question

Contemporary Sudanese debates on recovery increasingly recognise that reconstruction cannot proceed without addressing the structural imbalance between the centre and the peripheries. Recent constitutional and governance proposals, including the framework advanced recently, have emphasised the need to redefine the relationship between Khartoum and historically marginalised regions through a more devolved federal order grounded in equitable distribution of authority and resources (Satti, 2026).

These debates reflect a broader recognition that the pre-war Sudanese state was characterised not only by institutional fragility, but also by persistent asymmetries in political authority, development, infrastructure, and access to resources. Centralised governance structures frequently failed to accommodate Sudan's regional, cultural, and ecological diversity, contributing to recurring patterns of exclusion, uneven development, and weakened civic legitimacy. Under conditions of prolonged conflict and institutional fragmentation, these structural imbalances became increasingly unsustainable.

Within the Sudan National Recovery Framework (SNRF), this concern is extended beyond constitutional restructuring alone. Federalism is operationalised not merely as an administrative arrangement, but as a multi-level recovery architecture linking locally embedded systems—villages, PHC platforms, governance structures, economic systems, and regional coordination mechanisms—to a coherent national framework. The objective is not only to redistribute political authority, but to reconstruct operational functionality across interconnected levels of governance.

This distinction is critical. Conventional federal arrangements often transfer authority from the national centre to regional elites without reconstructing the underlying social and institutional systems through which governance operates. As a result, decentralisation may reproduce fragmentation rather than resolve it. The SVN–SNRF framework addresses this limitation by embedding recovery within socially grounded systems at the level where society continues to function, villages, neighbourhoods, local service platforms, and community governance structures.

In this model, local systems constitute the foundational operational units of national recovery. Authority, information, resources, and accountability move through structured vertical and horizontal relationships linking communities, localities, states, and national institutions. Governance, therefore, becomes polycentric and functionally integrated rather than merely territorially devolved. Local legitimacy is connected to national coherence through continuous flows of measurement, financing, and feedback.

The framework also extends federal restructuring into the domain of equitable resource allocation. Sudanese constitutional reform discussions have increasingly emphasised that the uneven distribution of resources has historically undermined both federal governance and national cohesion (Satti, 2025). Within

the **SVN-SNRF** architecture, redistribution is operationalised through structured financing systems, minimum service standards, and performance indicators generated through the Smart Village Composite Index (**SVCI**). This transforms equity from a declarative political principle into a measurable and governable system function.

Similarly, the **SVN-SNRF** approach broadens the concept of national integration. Unity is not treated as the product of administrative centralisation alone, but as an outcome of functional interdependence between local systems and national structures. Villages, **PHC** systems, local economies, and knowledge networks become connected nodes within a wider national recovery lattice, enabling both autonomy and coherence.

In this sense, emerging Sudanese proposals for federal restructuring identify an essential constitutional and political requirement for post-war recovery, while the **SVN-SNRF** framework provides the operational and systemic architecture through which such restructuring can become socially grounded, institutionally viable, and functionally sustainable.

The framework is therefore constructed around a principle of vertical integration. Authority flows downward in clearly defined mandates, while information, performance data, and community priorities flow upward through structured feedback channels. This creates a bidirectional system in which governance is both directive and responsive. The Smart Village functions as the operational node of the national recovery system, while the **SNRF** provides the governance architecture, standards, coordination mechanisms, and resource frameworks required to ensure that these nodes operate coherently, equitably, and at scale.

Governance within the **SNRF** is polycentric. Rather than concentrating power in a single central authority, it distributes defined responsibilities across multiple levels—village, locality, state, and national. Each level has bounded authority, explicit functions, and mechanisms of accountability. This structure reduces the risk of elite capture and administrative paralysis by ensuring that no single level monopolises decision-making or resource control. At the same time, coordination mechanisms—legal frameworks, fiscal systems, and data platforms—ensure that distributed authority does not lead to fragmentation.

A central component of the **SNRF** is its financing architecture. Recovery financing is not treated as an external input, but as an integral part of system design. Funds are channelled through structured mechanisms—national funds, state allocations, and local windows—that are linked to performance, transparency, and defined outputs. The concept of the “window,” including diaspora windows, allows resources to flow into the system even in conditions of political uncertainty or institutional weakness. This reduces dependency on fragmented project-based aid and aligns financial flows with system functionality.

Transparency is embedded in this architecture. Financial flows,

procurement processes, and resource allocations are subject to open reporting, independent audit, and community oversight. At the village level, governance structures are required to maintain visible records of decisions and expenditures. At higher levels, digital platforms and standardised reporting systems ensure comparability and accountability. Transparency is not an ethical add-on; it is a functional requirement for system trust and sustainability.

Knowledge sovereignty forms another pillar of the **SNRF**. Recovery is not only a material process but also an epistemic one. The framework recognises that sustainable systems depend on locally grounded knowledge, institutional memory, and professional capacity. Village knowledge hubs, linked to national archives and educational systems, serve as nodes for documentation, learning, and dissemination. This ensures that recovery is informed by local realities while connected to national and global knowledge systems.

The human dimension of the **SNRF** is articulated through the Al-Hakim framework. No governance system can function without individuals capable of operating across technical, cultural, and ethical domains. The **SNRF** therefore embeds professional development within its structure, promoting a cadre of practitioners who can integrate clinical competence, systems thinking, cultural intelligence, and adaptive leadership. These individuals act as carriers of coherence across the system, linking local practice with national policy.

Measurement and feedback are operationalised through the Smart Village Composite Index. The SVCI translates complex system performance into measurable indicators across domains such as health, governance, infrastructure, economy, and knowledge. These indicators are not used solely for evaluation but for continuous system adjustment. Data generated at the village level feeds into national dashboards, enabling real-time monitoring and evidence-based decision-making. This transforms governance from a static process into a dynamic, learning system.

The **SNRF** also incorporates preparedness and resilience as core functions. Post-conflict recovery is inherently unstable, and systems must be designed to absorb shocks—whether environmental, economic, or political. Preparedness is therefore embedded in infrastructure design, service delivery, and governance protocols. At the village level, this includes basic capacities such as emergency response, disease surveillance, and resource buffering. At the national level, it involves strategic reserves, contingency planning, and adaptive policy mechanisms.

Importantly, the **SNRF** is not conceived as a fixed blueprint but as a phased and adaptive framework. Implementation proceeds through stages—initial stabilisation, system construction, expansion, and consolidation. Each phase has defined objectives, indicators, and feedback loops. This phased approach allows the system to evolve in response to changing conditions, avoiding the rigidity that often undermines large-scale recovery plans.

The relationship between the **SVN** and the **SNRF** is therefore one of functional

integration. The **SVN** provides the operational logic and local implementation platform. The **SNRF** provides the governance, financing, and scaling architecture. Together, they constitute a unified recovery system in which local functionality and national coherence are mutually reinforcing. Without the **SVN**, the **SNRF** would remain abstract. Without the **SNRF**, the **SVN** would remain limited in scope. Their integration transforms recovery from a series of isolated interventions into a structured, national process.

In this sense, the **SNRF** represents a shift from recovery as policy to recovery as a system. It redefines the role of the state—not as a distant authority, but as an enabling structure that supports, regulates, and learns from locally embedded systems. By aligning governance with functionality and scaling with integrity, the **SNRF** provides the architecture through which Sudan's recovery can move from possibility to sustained reality.

Governance Architecture: A Multi-Level System

African recovery experiences provide important lessons for Sudan. They show that post-conflict reconstruction can restore services, rebuild infrastructure, and improve state capacity, but they also show the limits of partial models. Several countries have achieved measurable progress, yet most have done so within frameworks that remain either highly centralised, sectorally confined, or dependent on external aid. These experiences are therefore instructive not because they offer models to copy, but because they clarify the structural gaps that the **SVN** and the Sudan National Recovery Framework are designed to address.

Rwanda is often cited as a successful case of post-genocide recovery. Following the 1994 genocide, the state built a disciplined administrative system, strengthened performance monitoring, and used instruments such as *Imihigo* to align local action with national priorities. This enabled rapid gains in health, education, infrastructure, and public administration. The strength of the Rwandan model lies in coordination, policy discipline, and measurable implementation.

Yet this achievement also reveals a limitation. Rwanda's recovery has depended heavily on central authority and hierarchical coordination. Local systems operate effectively, but largely within a centrally directed framework. This has produced efficiency, but not necessarily distributed autonomy. For Sudan, the lesson is clear: coordination is essential, but recovery cannot depend solely on central command. A resilient recovery system must combine national coherence with locally embedded agency.

Ethiopia offers a different lesson through its Health Extension Programme. By deploying trained health workers at the community level, Ethiopia demonstrated the value of locally grounded primary health care, preventive services, and community-based delivery. The programme improved maternal and child health, immunisation, disease control, and household-level health practices. It confirms the argument that health systems can be rebuilt from the community level when operational roles are clearly defined.

However, Ethiopia's experience also shows the limits of sectoral success. The Health Extension Programme remained primarily a health intervention. It was not fully integrated with local governance, economic systems, infrastructure planning, or knowledge sovereignty. This demonstrates that primary health care can anchor recovery, but cannot by itself produce systemic transformation unless connected to wider domains of governance, livelihoods, water, sanitation, education, and local accountability.

Mozambique illustrates a third pattern. After the Civil War, donor-supported reconstruction enabled the restoration of infrastructure, services, and formal institutions. External assistance helped stabilise parts of the system and provided essential resources. Yet the aid architecture also produced fragmentation. Multiple donors, projects, and implementing agencies often operated through parallel systems, weakening national coherence and bypassing local institutional development. The result was visible reconstruction without sufficiently durable system integration.

Across these cases, a consistent pattern emerges. Rwanda demonstrates coordination without sufficient distributed autonomy. Ethiopia demonstrates community-based service delivery without full system integration. Mozambique demonstrates resource mobilisation without adequate institutional coherence. Each case offers valuable lessons, but none fully integrates local functionality, multi-domain system design, embedded measurement, and national governance within a single architecture.

The significance of the **SVN-SNRF** model lies in its ability to address these limitations together. The **SVN** provides a local operational platform through which health, governance, the economy, infrastructure, and knowledge can be rebuilt as a single system. The **SNRF** provides the national architecture required to coordinate, finance, regulate, and scale these local systems. The Smart Village Composite Index adds a mechanism for measurement, feedback, and adaptive governance.

The comparative evidence, therefore, reinforces the central argument of this chapter. Partial recovery is possible through central coordination, sectoral delivery, or donor-supported reconstruction. Sustainable recovery, however, requires an integrated architecture that links society, state, knowledge, and resources across levels. The **SVN** and the Sudan National Recovery Framework do not reject African experience; they absorb its lessons and reorganise them into a more coherent system for Sudan's recovery.

15. Equity, Redistribution, and Social Justice in Recovery

Recovery systems must address the structural inequalities that contribute to fragility and collapse. Without deliberate correction, recovery risks reproducing uneven access, exclusion, and regional disparity. Within the **SNRF**, equity is therefore treated not as a normative aspiration, but as a functional condition of

system stability and effectiveness.

Redistribution is central to this design. Financial, material, and human resources are allocated according to need, system functionality, and priority gaps rather than administrative access or political influence. Determination of need is informed by system-level data, including indicators generated through the Smart Village Composite Index (SVCI), which identify disparities in service access, infrastructure, and operational capacity. This enables resource flows to be directed toward areas of greatest deficit, supporting balanced system performance.

Minimum service standards provide a complementary mechanism for operationalising equity. These standards define baseline access to essential services—primary health care, water and sanitation, basic education, and energy—across all regions. They function as reference points for planning, monitoring, and accountability, ensuring that system effectiveness is assessed not only through aggregate outcomes but through the consistent achievement of minimum thresholds.

Inclusive governance reinforces these mechanisms by ensuring that decision-making reflects the composition of affected populations. The structured participation of women, youth, and displaced groups enables local priorities to inform resource allocation and service design. Inclusion, in this context, is not symbolic; it is a structural requirement for responsiveness, legitimacy, and system coherence.

Equity is further embedded through multi-level governance. Local systems identify needs and priorities; regional structures coordinate redistribution across multiple sites; and national institutions ensure alignment with system-wide objectives. This layered process reduces disparities while maintaining responsiveness to diverse local conditions. In institutional terms, social equity requires the fair and just distribution of public services and resources, taking into account historical and structural inequalities.

From a systems perspective, equity is directly linked to stability and performance. Unequal systems are more prone to breakdown: disparities in service access weaken health outcomes, reduce economic productivity, and erode social cohesion. Conversely, systems that ensure minimum levels of access and balanced resource distribution are more resilient and better able to sustain coordinated function over time.

Within the **SNRF**, social justice is therefore realised through system design rather than declarative commitment. It is embedded in how resources are allocated, how services are distributed, and how decisions are structured across levels. This aligns with broader post-conflict reconstruction principles, which emphasise addressing root inequalities—economic, political, and social—as a condition for sustainable recovery.

Equity, in this formulation, is not an external objective of recovery. It is an intrinsic property of a system designed to operate coherently, adaptively, and at a national scale.

16. Preparedness, Resilience, and Human Security

Recovery systems in Sudan must be designed to operate under conditions of persistent uncertainty. Conflict, displacement, disease outbreaks, and environmental stress are not episodic disruptions but structural features of the operating environment. Preparedness and resilience must therefore be embedded within system design rather than treated as external or sequential objectives.

Preparedness begins with continuous detection. At the local level, PHC systems, community networks, and governance structures function as distributed observation nodes, identifying emerging risks through routine interaction. Health surveillance, environmental monitoring, and community reporting generate early signals of system stress, enabling timely response before disruption escalates.

Response capacity depends on coordinated system activation. When risks are identified, multiple domains must be mobilised in alignment. Health systems provide diagnosis and treatment; governance structures coordinate action and resource allocation; infrastructure systems—particularly water, sanitation, and energy—support containment and mitigation; and community networks enable communication and behavioural response. This coordinated activation transforms isolated reactions into system-level responses.

Resilience is achieved through continuity of function. Systems are designed to maintain operation under stress rather than suspend activity and require later restoration. This requires redundancy in critical functions, flexibility in resource use, and the capacity to reallocate effort across domains. Disruptions in formal services can be absorbed through community-based systems, while infrastructure adaptations reduce vulnerability to environmental shocks.

Human security provides the organising framework for these functions. Security is defined not only as protection from violence, but as sustained access to essential conditions of life—health care, food, water, and basic services. In this formulation, human security becomes a system output, maintained through coordinated operation across domains. This aligns with broader understandings of social justice as equitable access to rights, resources, and life conditions.

These functions operate across levels. Local systems detect and respond to immediate risks; regional structures coordinate support across multiple sites; national systems provide enabling conditions through policy, financing, and regulation. Measurement tools such as the SVCI reinforce this process by identifying vulnerabilities and guiding adaptive response.

A defining feature of this approach is continuity. Systems are not designed to fail and recover; they are designed to remain functional under varying levels of stress. This distinction is critical in contexts where disruption is recurrent rather than exceptional.

Preparedness and resilience are therefore not outcomes of recovery. They are intrinsic properties of systems deliberately designed to anticipate, absorb, and respond to shocks while maintaining functionality.

17. Knowledge Systems and Institutional Renewal

Sustainable recovery requires institutional systems capable of generating, organising, and applying knowledge in alignment with operational needs. While knowledge sovereignty defines the principle of epistemic alignment, its realisation depends on the renewal and coordination of institutions that produce and sustain knowledge.

Within the **SNRF**, institutional renewal focuses on the reorganisation of core knowledge-producing and knowledge-regulating entities, including universities, research centres, professional bodies, and training institutions. These institutions form the structural foundation of a national knowledge system.

Universities and training institutions are responsible for aligning education with system requirements. Professional training must be oriented toward community-based systems, integrated service delivery, and multi-domain coordination. This includes preparing practitioners capable of operating within PHC systems, governance structures, and community environments, linking learning directly to operational contexts (El Safi, 2006).

Research institutions provide the system's analytical capacity. Their role is to generate context-relevant knowledge from system performance data, including health data, environmental conditions, economic activity, and governance processes. This requires a shift from externally driven research agendas toward priorities emerging from practice within the **SVN**.

Professional bodies and regulatory institutions ensure quality, consistency, and accountability. Through accreditation, standard-setting, and oversight, they maintain the integrity of professional practice across domains, reinforcing system trust.

Knowledge retention is a critical component of institutional renewal. Archival systems—including health records, institutional histories, and scientific outputs—are organised as active resources for planning and policy. These systems preserve accumulated experience, enabling continuity across phases of recovery and reducing dependence on external knowledge sources (El Safi, 2012).

The effectiveness of these institutions depends on their integration with operational systems. Knowledge generated at the local level—through PHC units, governance processes, and community systems—is aggregated, analysed, and fed into institutional structures. In turn, institutions provide guidance, training, and standards that strengthen local system performance. This creates a continuous cycle linking practice, knowledge, and policy.

Within this architecture, knowledge systems function as an integrated institutional network rather than isolated entities. Universities, research centres, and professional bodies operate as interconnected components aligned with system needs and coordinated through the **SNRF**.

Institutional renewal, therefore, transforms knowledge from a fragmented resource into a structured system capability. By linking knowledge production, regulation, and application across levels, it ensures that recovery is informed by continuous learning and grounded in national experience.

18. Integrated Synthesis: A System for National Recovery

This chapter has advanced a unified architecture for recovery grounded in the realities of systemic collapse. It has been argued that recovery cannot be achieved through restoration of prior structures or through fragmented interventions. It requires the deliberate construction of an integrated system linking local functionality with national coordination.

The **SVN** provides the operational foundation. It demonstrates how systems can be rebuilt within socially embedded structures through the integration of health, governance, economy, infrastructure, and knowledge. Recovery begins where systems endure and proceeds through the organisation of these capacities into coherent, interdependent functions.

The **SNRF** provides the governing architecture through which these systems are coordinated, scaled, and sustained. It establishes the mechanisms of alignment—policy, resource allocation, regulation, and feedback—required to transform distributed local systems into a coherent national process.

Together, the **SVN** and the **SNRF** form a single recovery system. The **SVN** operates as the level of implementation; the **SNRF** provides coordination and governance. Their relationship is functional rather than hierarchical: each depends on the other. Without operational systems, governance remains abstract; without governance, local systems remain fragmented.

This integration operates across multiple dimensions. Structurally, it links village-level systems to national institutions. Functionally, it aligns interdependent domains within a unified system. Epistemically, it connects local knowledge with institutional learning and policy. Institutionally, it coordinates authority, resources, and accountability across levels.

A central element of this architecture is human capability. The Al-Hakim framework defines a professional model integrating technical competence, cultural intelligence, ethical grounding, and systems thinking (El Safi, 2013; 2024). These actors function as carriers of coherence, enabling translation between system levels and sustaining integration in practice.

The significance of this approach lies in its departure from conventional recovery models. Rather than beginning with centralised plans or externally driven interventions, it begins where functionality persists and builds upward. Recovery is constructed through the alignment of socially embedded systems with institutional coordination, not imposed through administrative design.

In this formulation, recovery is not a return to a previous state. It is the construction of a new system—integrated, adaptive, and grounded in the capacities of society. Its effectiveness depends on the strength of relationships between components, the coherence of governance across levels, and the continuous interaction between knowledge, action, and learning.

This architecture provides not only a response to collapse, but a framework for long-term stability. By linking local systems to national governance within a unified structure, it establishes the conditions for recovery that is scalable, equitable, and sustainable.

ANNEX I — THE AL-HAKEEM COMPETENCY FRAMEWORK

The Human Architecture of Recovery

Introduction

No recovery system can function without the human capacity to operate it. The Al-Hakeem framework defines a professional archetype capable of sustaining coherence across fragmented systems, integrating technical excellence with cultural, ethical, and systemic intelligence.

Framework Components

1. **Technical Competence:** Mastery of discipline-specific knowledge and evidence-based practice.
2. **Cultural Intelligence:** Ability to interpret and work within Sudan's plural social, linguistic, and belief systems.
3. **Ethical Grounding:** Commitment to integrity, accountability, and service to society.
4. **Systems Thinking:** Capacity to understand interdependencies, feedback loops, and non-linear system behaviour.
5. **Adaptive Capacity:** Ability to function under uncertainty, crisis, and institutional fragility.
6. **Community Orientation (COME+):** Alignment with community-based service models and local knowledge systems.
7. **Leadership and Mediation:** Skills in negotiation, conflict resolution, and collective decision-making.

Operational Role in SVN and SNRF

The Al-Hakeem professional functions as a carrier of system coherence, linking:

- Village-level implementation (SVN)
- Institutional coordination (SNRF)
- Knowledge systems (COME+)

Conclusion

Embedding the Al-Hakeem framework ensures that recovery is not only structurally sound but also humanly sustainable.

ANNEX II — VILLAGE TYPOLOGIES IN POST-CATASTROPHE SUDAN

Introduction

Recovery must be adapted to heterogeneous realities. Sudan's villages differ in ecology, conflict exposure, displacement status, and resource endowment.

Typology Categories

1. Stable Rural Villages
Relatively intact social and physical structures.
2. Conflict-Affected Villages
Partial infrastructure destruction and disrupted governance.
3. Displacement-Hosting Villages
High demographic pressure and service overload.
4. Returnee Villages
Populations re-establishing after displacement.
5. Urban-Periphery Settlements
Informal settlements with hybrid rural–urban characteristics.
6. Pastoral and Nomadic Zones

Mobile populations require non-static service models.

Implications for SVN Design

- Service packages must be modular and adaptive
- Governance models must reflect local legitimacy structures
- Resource allocation must align with population dynamics

Conclusion

Typology-based planning ensures that SVN operates as a differentiated system rather than a uniform template.

ANNEX III — THE MINIMUM SMART VILLAGE PACKAGE (MSVP)

Life, Dignity, and Preparedness

Introduction

The MSVP defines the minimum threshold for a functioning recovery unit at the village level.

Core Components

1. Primary Health Care Unit
6–8 rooms, staffed by trained personnel and community health workers.
2. Water and Sanitation System
Safe water supply and basic sanitation infrastructure.
3. Energy Platform
Solar-first energy solutions with scalable capacity.
4. Local Governance Structure
Elected, representative, and accountable village council.
5. Livelihood Platform
Support for agriculture, micro-enterprise, and local markets.
6. Education and Knowledge Hub
Schooling integrated with digital access and archival capacity.
7. Data and ConnNode (SVCI-enabled)
Monitoring, reporting, and integration with national systems.

Operational Principle

The MSVP is not a checklist of inputs but a functional system, where each component reinforces others.

Conclusion

The MSVP establishes a universal baseline while allowing contextual adaptation.

ANNEX IV — THE SMART VILLAGE COMPOSITE INDEX (SVCI)

Measurement as Governance

Introduction

Effective recovery requires measurable performance. The SVCI provides a multidimensional tool for monitoring system functionality.

Domains of Measurement

1. Health system performance
2. Water and sanitation access
3. Energy reliability
4. Governance and participation
5. Livelihood resilience
6. Education and knowledge access
7. Social cohesion and inclusion

Technical Structure

- Composite index combining quantitative and qualitative indicators
- Weighted scoring system reflecting system priorities
- Periodic data collection at village level

Functions

- Monitoring progress
- Informing resource allocation
- Enabling accountability
- Supporting adaptive management

Conclusion

The SVCI transforms measurement into an active component of governance and system learning.

ANNEX V — GOVERNANCE ARCHITECTURE: POLYCENTRIC AND EMBEDDED

Introduction

Recovery requires governance that is legitimate, distributed, and adaptive.

Core Principles

1. Polycentric Governance
Multiple centers of decision-making operating in coordination.
2. Embedded Legitimacy
Authority derived from community participation.
3. Transparency and Accountability
Open processes for resource use and decision-making.
4. Inclusion

Representation of women, youth, and displaced populations.

Institutional Layers

- Village councils (SVN)
- District coordination mechanisms
- National framework (SNRF)

Conclusion

Governance is not an external layer but an embedded function of system performance.

ANNEX VI — FINANCING MECHANISMS FOR RECOVERY

From Fragmentation to Functional Flows

Introduction

Financing must support system integration rather than sectoral fragmentation.

Key Mechanisms

1. Sudan Recovery and Financing Platform (SRFP)
Central coordinating mechanism for recovery financing.
2. The “Window” Model
Thematic funding streams aligned with system components.
3. Diaspora Financing Channel
Direct engagement of Sudanese diaspora in funding and oversight.
4. Blended Finance Approaches
Combining grants, concessional loans, and local contributions.

Operational Principles

- Minimize administrative overhead
- Ensure direct flow to implementation units
- Align funding with system performance (SVCI-linked)

Conclusion

Financing becomes an operational component of recovery rather than an external constraint.

ANNEX VII — KNOWLEDGE SOVEREIGNTY AND INSTITUTIONAL RENEWAL

Introduction

Recovery requires rebuilding not only infrastructure but also knowledge systems.

Core Elements

- National archival systems
- Integration of traditional knowledge
- Reform of professional education (COME+)
- Digital knowledge platforms

Strategic Role

- Supports evidence-based policy
- Preserves cultural and scientific heritage
- Enables long-term institutional resilience

Conclusion

Knowledge sovereignty is foundational to sustainable recovery.

ANNEX VIII — ALIGNMENT WITH INTERNATIONAL NORMATIVE FRAMEWORKS

Introduction

The SNRF aligns with global standards while maintaining national ownership.

Key Frameworks

- Sustainable Development Goals (SDGs)
- One Health approach
- Human rights conventions
- Humanitarian–development–peace nexus

Function

- Facilitates donor alignment
- Ensures compliance with international norms
- Enhances global legitimacy

Conclusion

Alignment strengthens cooperation without compromising sovereignty.

ANNEX IX — IMPLEMENTATION MATRIX AND PHASING

Introduction

Recovery must be sequenced and operationalized.

Phases

Phase	Timeline	Priority
Phase 1	0–6 months	Stabilisation
Phase 2	6–24 months	MSVP rollout
Phase 3	2–5 years	Network integration
Phase 4	5–10 years	National consolidation

Matrix Components

- Activities
- Responsible actors
- Resource requirements
- Indicators (SVCI-linked)

Conclusion

Phased implementation ensures coherence between immediate action and long-term transition.

ANNEX X — INSTITUTIONAL MAPPING AND ROLE ALLOCATION

Operational Responsibilities within the SVN–SNRF Recovery Architecture

Introduction

Recovery systems fail when institutional responsibilities are unclear, overlapping, or disconnected from operational reality. In post-catastrophe environments, fragmented authority, duplicated mandates, and parallel implementation structures weaken coordination, reduce accountability, and undermine sustainability.

The SVN–SNRF framework addresses this challenge through a structured institutional architecture that defines responsibilities across multiple levels while maintaining functional integration. Institutional roles are allocated according to operational capacity, proximity to implementation, and system function. Authority is therefore distributed rather than concentrated, while coordination mechanisms ensure coherence across levels.

This annex maps the principal institutional actors within the SVN–SNRF architecture and clarifies their respective functions in governance, implementation, financing, coordination, knowledge production, and system oversight.

The objective is not to create new bureaucratic layers, but to align existing and emerging institutions within a coherent recovery system.

1. Principles of Institutional Allocation

Institutional roles within the SVN–SNRF architecture are guided by the following principles:

1. Functional Clarity

Each institution must possess clearly defined operational responsibilities to minimise duplication and administrative conflict.

2. Subsidiarity

Functions should be performed at the lowest level capable of executing them effectively, while higher levels provide coordination, standards, and support.

3. Polycentric Governance

Authority is distributed across multiple interconnected centres of decision-making rather than concentrated in a single hierarchy.

4. Embedded Legitimacy

Institutions derive effectiveness from alignment with socially grounded systems and community participation.

5. Transparency and Accountability

All institutions must operate through documented procedures, measurable outputs, and publicly accessible reporting mechanisms.

6. Adaptive Coordination

Institutional relationships must remain flexible enough to respond to changing conditions while maintaining systemic coherence.

2. Institutional Architecture of the SVN–SNRF System

The SVN–SNRF system operates across five interconnected institutional levels:

Level	Core Function
Village Level	Direct implementation and community coordination
Locality/District Level	Operational integration and supervision
State/Regional Level	Strategic coordination and resource distribution
National Level	Policy, standards, financing, and regulation
International and Diaspora Level	External support, financing, partnerships, and technical cooperation

These levels function as an integrated governance system linked through information flows, financing mechanisms, accountability structures, and performance monitoring.

3. Village-Level Institutions (SVN Operational Core)

3.1 Village Recovery Council (VRC)

Core Function

Primary governance and coordination body at village level.

Responsibilities

- Coordinate implementation of the MSVP
- Supervise local service integration

- Facilitate community participation
- Maintain transparency of decisions and expenditures
- Resolve local operational disputes
- Support SVCI data collection and reporting
- Coordinate preparedness and emergency response

Composition

- Community representatives
- Women representatives
- Youth representatives
- Health personnel
- Education representatives
- Traditional/community leaders
- Livelihood and cooperative representatives

Accountability

- Directly accountable to village population
- Operationally linked to locality coordination structures

3.2 Primary Health Care Unit (PHC Node)

Core Function

Operational anchor of integrated village systems.

Responsibilities

- Deliver essential health services
- Conduct disease surveillance
- Generate routine system data
- Coordinate health-related emergency responses
- Support nutrition and environmental monitoring
- Link communities with higher referral systems
- Facilitate health education and behavioural communication

Strategic Role

Acts as:

- service platform
- surveillance node
- governance interface
- coordination trigger

within the SVN system.

3.3 Village Knowledge and Learning Hub

Core Function

Local knowledge infrastructure and communication node.

Responsibilities

- Support civic education
- Maintain local archives and records
- Facilitate digital connectivity
- Provide educational access
- Support data management and reporting
- Document indigenous knowledge and local practices
- Link local learning to national knowledge systems

Strategic Role

Functions as the village-level interface between:

- knowledge
- governance
- education
- adaptation
- institutional memory

3.4 Community Livelihood and Cooperative Structures

Core Function

Support local economic resilience and household stability.

Responsibilities

- Coordinate agricultural and livelihood activities
- Support micro-enterprise systems
- Facilitate local markets and resource circulation
- Strengthen food security systems
- Link economic activity to village governance structures

4. Locality and District-Level Institutions

4.1 Locality Recovery Coordination Unit (LRCU)

Core Function

Operational coordination across multiple villages.

Responsibilities

- Supervise village-level implementation
- Aggregate SVCI data
- Coordinate logistics and supply chains
- Support inter-village resource allocation
- Resolve cross-village operational issues
- Coordinate emergency response across localities
- Ensure alignment with state-level planning

Strategic Role

Acts as the primary operational bridge between:

- local implementation
- regional coordination

4.2 Locality Technical Support Teams

Core Function

Provide specialised technical assistance.

Responsibilities

- Engineering support
- PHC supervision
- water and sanitation support
- renewable energy maintenance
- agricultural extension
- digital systems support
- governance training

Strategic Role

Provide mobile technical capacity in fragile environments where specialised personnel remain limited.

5. State and Regional-Level Institutions

5.1 State Recovery Coordination Authority (SRCA)

Core Function

Regional strategic coordination and oversight.

Responsibilities

- Coordinate state-level recovery planning
- Allocate regional resources

- Supervise locality coordination systems
- Integrate state data into national reporting
- Coordinate with ministries and national agencies
- Monitor equity and redistribution across localities
- Support preparedness and resilience planning

Strategic Role

Ensures:

- territorial coherence
- regional equity
- policy adaptation to diverse contexts

5.2 State Knowledge and Training Platforms

Core Function

Regional professional development and applied research.

Responsibilities

- Train SVN personnel
- Support COME+ implementation
- Conduct applied operational research
- Support institutional learning
- Maintain regional archives and documentation systems

6. National-Level Institutions (SNRF Core Architecture)

6.1 Sudan National Recovery and Reconstruction Framework Authority (SNRFA)

Core Function

Central coordinating architecture of the recovery system.

Responsibilities

- Establish national recovery policy
- Define standards and operational frameworks
- Coordinate financing systems
- Regulate system integration
- Maintain national monitoring platforms
- Coordinate donor engagement
- Ensure national accountability and transparency
- Align recovery with constitutional and legal frameworks

Strategic Role

Acts as:

- coordinating authority
- regulatory architecture
- system integrator

rather than a centralised implementation bureaucracy.

6.2 National Smart Village Network Directorate

Core Function

National operational coordination of the SVN.

Responsibilities

- Support village system replication and scaling
- Standardise MSVP implementation
- Coordinate technical guidelines
- Maintain SVN operational standards
- Support cross-state learning and exchange

6.3 National SVCI Observatory

Core Function

Measurement, monitoring, and adaptive governance.

Responsibilities

- Maintain national SVCI dashboards
- Analyse performance trends
- Generate early warning indicators
- Support evidence-based policy adjustment
- Publish periodic system reports
- Support transparency and accountability

Strategic Role

Transforms governance into a continuous learning process.

6.4 National Financing and Recovery Platform (NFRP)

Core Function

Integrated recovery financing architecture.

Responsibilities

- Manage recovery funds

- Coordinate funding windows
- Operate diaspora financing mechanisms
- Ensure transparent resource allocation
- Conduct audits and financial reporting
- Align donor financing with national priorities

Strategic Role

Reduces fragmentation by integrating:

- public finance
- donor support
- diaspora contributions
- private sector participation

within a unified system.

7. Universities, Professional Bodies, and Knowledge Institutions

7.1 Universities

Responsibilities

- Align curricula with recovery system needs
- Train Al-Hakeem professionals
- Support community-based education
- Conduct applied systems research
- Strengthen knowledge sovereignty

7.2 Professional Councils and Regulatory Bodies

Responsibilities

- Accreditation and licensing
- Standard-setting
- Ethical oversight
- Quality assurance
- Professional accountability

7.3 Sudan Medical Heritage and Archival Institutions

Responsibilities

- Preserve institutional memory
- Document indigenous and scientific knowledge
- Support historical continuity
- Maintain national archives relevant to recovery and governance

8. Civil Society, NGOs, and Community Organisations

Core Function

Support implementation while remaining aligned with national architecture.

Responsibilities

- Technical implementation support
- Community mobilisation
- Capacity development
- Emergency response support
- Advocacy and civic engagement

Operational Principle

External organisations must operate through SVN–SNRF structures rather than parallel systems.

9. Diaspora Institutions and International Partners

9.1 Sudanese Diaspora Platforms

Responsibilities

- Financial contributions
- Technical expertise
- mentorship and training
- international advocacy
- investment facilitation
- institutional partnerships

Strategic Role

The diaspora functions as a strategic recovery resource rather than an external charitable actor.

9.2 International Development Partners

Responsibilities

- Financial support
- technical cooperation
- institutional partnerships
- emergency assistance
- infrastructure support

Operational Principle

International engagement must align with:

- national ownership
- institutional coherence
- transparency requirements
- local system strengthening

10. Accountability and Coordination Mechanisms

Institutional effectiveness depends on structured coordination and accountability systems.

Core Mechanisms

1. SVCI-Based Monitoring

Performance measured through integrated indicators.

2. Financial Transparency Systems

Open reporting and audit mechanisms.

3. Community Oversight

Participatory review and accountability processes.

4. Multi-Level Reporting

Structured upward and downward information flows.

5. Periodic System Reviews

Continuous adaptation and institutional learning.

Conclusion

The SVN–SNRF recovery architecture depends on institutional alignment rather than institutional expansion. Its effectiveness derives from clearly defined responsibilities, embedded legitimacy, transparent coordination, and continuous feedback across levels.

Village systems provide operational functionality. Locality and regional structures provide coordination and adaptation. National institutions provide policy, financing, regulation, and strategic integration. Universities, professional bodies, civil society organisations, diaspora actors, and international partners reinforce system capacity within a coherent framework.

Together, these institutions form a distributed yet integrated architecture capable of sustaining recovery under conditions of fragility, uncertainty, and long-term transformation.

Institutional mapping, in this sense, is not merely administrative. It is a mechanism for converting recovery from fragmented intervention into a functioning national system.

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