

The Crisis of Runoff Control in Greater Khartoum

Elnaiem M. Ibrahim¹ and Dr. Elfadil A. Adam²

¹PhD. Candidate, Sudan University for Science and Technology, (rayanelnaimmohibr@gmail.com ; 0912367155).

²Head Department of Architecture, University of Science and Technology-Omdurman.

ABSTRACT

This research paper performed in Greater Khartoum and intended to investigate the seasonally occurring runoff control crises that induces severe impacts on public utilities, communities and the environment. Secondary data collected via literature reviewed and primary data from observed knowledge, real life truths, and interviews and consultations used to discuss and analyze causes of the problem. The paper concluded that the lack of political will is the mother problem that produced the sequential causes, and recommended reform of the political mind-set and building strong will to undertake change.

KeyWords: Control, Communities, Environment, Life truths, Political will, Runoff, Public utilities.

1- INTRODUCTION

Accelerating urban population is an old worldwide phenomenon emerged due to increasing settlers driven by economic and/or security needs that usually leads to urban spreading and consequent serious impacts. The situation is more complicated in developing countries, including Sudan, where political instability, economic degradation and natural hazards exceed government's intents and potentials to manage the phenomenon. Runoff control is an urban issue impacted by urban spreading and has its impacts on the environment.

The paper topic is the challenge induced by uncontrolled runoff flooding on the urban settlements of Greater Khartoum that recurrently results in life and property losses, injuries, environmental degradation, health risks and life disturbance. Fig. (1). Information pertaining to detailed flood hazards impacts is very little and conflicting all the time due to absence of standardized statistical assessment procedures that provide estimates of the potential impacts and relevant costs. Authorities in Sudan accustomed to hide such information on the

plea of security considerations. Table (1), displays some statistics collected from

different non-governmental sources.



Fig. (1). Prospects from autumn 2018.

Table (1), Estimates of flooding impacts.

Year	Affected people	Deaths	Injuries	Inclusive damages	Submerged land
1946 K					Thousands of acres
1988 K	1500000				
2007 S	750000	122	365	150000	
2013 K				Thousands	
2018 S	222275	23	60	19640	
2020 S	3000000	100		100000	

S (flooding event over Sudan), K (flooding event over Greater Khartoum).

Greater Khartoum commonly subjects to two categories of runoff and flooding risks:

- 1- Fluvial floods, when water in the confluent White and Blue Niles rises and overflows onto the surrounding banks and neighboring inhabited and cultivated lands.
- 2- Pluvial floods resulting in flash and surface floods from remote sources or anywhere rainwater collects within Greater Khartoum.

2- NATRUCTURAL FEATURES OF GRATER KHARTOUM

Greater Khartoum is geographically a unique city, blessed with a stunning location and juts into the waters at the confluence of

This paper intended to deal with category (2), aiming to reduce the impact of floods on the urban settlements through identifying causes behind runoff control. The methodology adopted is to discuss and analyze the basic and direct causes of the problem, using data collected from observed knowledge, real life truths, and interviews and consultation to attain results and appropriate solutions.

the White and Blue Niles where they originate the River Nile. The rivers layout dividing it into Khartoum, Omdurman and

Khartoum North cities in an ever so captivating panorama. It lies at almost the northern center of Sudan between 15 and 16 degrees latitude north and between 31 and 32 degrees longitude east, extending over an area in excess of eight hundreds square kilometers. It is the capital of Sudan, the heart of Africa and is the gate and navel between Arab and African nations. It is a wealthy country possessing ethnical, cultural, geographical and climatic and natural resources diversities.

Greater Khartoum features a hot desert climate (hot arid). It is extremely dry for most of the year. The annual rainfall amounts for average of 121.3 mm of precipitation with only months of July and August witnessing maximum precipitation. Its topography is somewhat undulating at Omdurman and flat at Khartoum and Khartoum North with an elevation of 381

3- URBAN PLANNING

Khartoum has been planned a number of times, the latest is the Khartoum planning project (KPP5) that produced the Khartoum structural plan with the base year (2008), and conduced to denomination of the three towns of Khartoum, Khartoum North and Omdurman as Grater Khartoum. The urban planning of Greater Khartoum, described as poor, blamed for not responding to urban settling requirements. People allowed settling in low lands apparently subjected to flooding either, on floodplains, historical torrential waterways or that susceptible to rainwater accumulation. In addition to the fact that most of Greater Khartoum parts are originally slum settlements or old villages at the peripheries of the old cities. These

4- CAUSES OF THE CRISES

The issue of storm runoff in Greater Khartoum made rain season instead of being

meters above sea level. Land features are mostly buildings, streets and farms. The geology, dominated by thick layer of Miocene-Quaternary sediments geologically recognized as Upper Gezira Formation, underlain with Sandstone known as Lower Omdurman Formation. The alluvial formations overlies older formations of Nubian Sandstone formation (NSF). The clay blanket in Khartoum and Khartoum North varies in thickness, properties and known to be potentially expansive with varying degree of swelling potential. The depth to the static water level in the area ranges from few to more than hundred meters, the aquifer system mainly developed in the Nubian Sandstone Formation and partly in the Gezira Formation, it is recharged almost exclusively from Nile Rivers and divided into upper and lower aquifer zones.

settlements considered as a fait accompli and just some adjustments and improvements applied, governed by no planning determinants and lacking almost all urban landscape components that has the potential to share rainwater runoff control in support of perfect runoff drainage network system which, either missing, malfunctioning or of limited service coverage. Urban situation in Greater Khartoum today characterized by resource misuse, (land, water, waterways and nature), dramatic environmental degradation and life deterioration [1]. Urban planning seemingly subjugated to political craze rather than planning ideologies and concepts.

blessing and enjoyable, has got a period of anxiety, fears, losses, urban insecurity,

confounding environmental disorder and spreading of a wave of destructive waterborne diseases. This scenario is not newly developed; it is extending far into the past and is getting worse and worse every year, up today by the changing urban factors that left to aggravate the already strained problem of storm runoff. It necessarily known that, when rain occurs and runoff generates, only three scenarios exist; one is

4.1 Basic Causes

4.1.1 Lack of Strategies

Various documentary, urban related institutions and reports interviewed or consulted for runoff and flooding control strategies:

- The National Record Office.
- The Technical Unit for implementation of Khartoum Structural Plan, KPP5 (2008).
- The National Council for Physical Development.
- The Minister for Public Works and Housing Planning in his speech on the World Housing Day Oct. 1998 asserted nonexistence of urban strategies and policies [2].
- The National Guide for Physical Planning, the second and last publication, Oct. 2015,
- The Sudan's Report for United Nations Third Conference on Housing and Sustainable Urban Development (Habitat 111). 2016.

4.2 Direct Causes

4.2.1 Poor Urban Planning

Urban planning in Greater Khartoum, described as poor, blamed for not responding to urban settling requirements.

disposal, the second is conservation and the third is devastation and environmental spoilage. Conditions on ground and real life truths show that Greater Khartoum was seemingly opted for the third one. Runoff is not a problem in itself, only mismanagement made a problem of it, the problem originated and enhanced by different causes identified as:

- The Concluding Report for the Committee of rains and floods Impacts Parrying, 2014.

They all blaming lack of strategies and policies.

4.1.2 The Lagging Political Attitude

- Lack of political will and decision is the mother problem that produced the direct causes.
- The political system everywhere and then is the sole responsible for the welfare of the community, the sole responsible for finance providing, the sole authorized and empowered entity and the sole who can create and benefit from the state of disorder and lawless life [3] and [4].

Politicians in Sudan only fully occupied with disputing leadership other than anything else since independence in 1956.

People allowed settling in flood prone zones and the other majority of Greater Khartoum parts are slum settlements or old villages slightly adjusted for urban settling, lacking necessary urban components and mature infrastructures crucial to runoff control. The

city has never been a one dense built-up entity, as the case here, but always including a variety of different forms and components that has the potential to share runoff control and enhance city's resilience.

4.2.2 Miss-coordination between Urban Institutions

Greater Khartoum is suffering institutional fragmentation in public policy and decision-making, and failure in linking urban planning with the activities of other urban sectors that lead to conflicting handling of urban services ended up with runoff control complications. Fig. (3). Sound urban management is a matter of integrated activities based on shared principles and objectives under full accountability.



Fig. (3) Sewers, water mains left open for years after maintenance and random electrical poles.

4.2.3 Ineffective or mostly no Storm Water Infrastructure

The situation in Greater Khartoum is lacking basic runoff drainage infrastructure that considers the overall catchment drainage approach and estimated runoff volumes;

where drains exist, they are mostly earthy, badly constructed or open built drains lacking follow up and cleaning, necessary maintenance and accumulated by sediment and garbage that put them malfunctioning all through [5]. Fig. (4).



Fig. (4) Lack of maintenance and accumulation sediment and garbage, catching only direct rains with no outlet.

4.2.4 Institutional and Personnel Capacity

The on ground conditions and real life truths, regarding runoff control, reflects ineffective management system, institutional

arrangements and governance measures , and weak institutional and expert personnel capacity, but the other face of the truth is that they are not required to do more than what is currently seen. In Sudan's management philosophy, organizational mistakes never acknowledged and organizations do not hold themselves accountable for their failure to do what expected from them.

4.2.5 Urban Streets

While performing their planning, environmental and aesthetical functions, urban streets accommodate runoff control facilities. Streets in Greater Khartoum, mostly earthy or badly conditioned macadamized, completely out of urban

measures and statutory controls that made them imperfect for runoff flow and drainage due to uncontrolled development activities and outreaching the right- of-way by residents and service providing actors. Therefore runoff waters usually retained all over until lost by evaporation only.

4.2.6 Solid Waste

Absence of strategies and policies obliged residents to dispose solid waste randomly on streets, vacant lots and dumping in open storm drains, scattered floatables as well, end up in storm drains wherever exist. The complete failure of solid waste management added additional impediments to surface flow and runoff drainage. Fig. (5)



Fig. (5) Solid waste impeding water flow.

4.2.7 Public Culture and Habits

Construction debris and residue, excavated and backfilling soils, commonly laid on streets and vacant lots; residents flagrantly and overtly overreaching the right-of- way. When runoff generates, clashes evolve

between residents, who assumed to live in urban peace and harmony, to avoid flooding impacts; those same residents used to dispose solid waste in violation of the right urban culture. These actions turned into public culture and habits in the absence of governance measures. Fig. (6).



Fig. (6) Construction residue, backfilling soil and overreaching constrain storm movement

4.2.8 Green Infrastructure Practice

Green elements shyly incorporated in a limited extent as isolated practices that meant to cast beautification values. Where exist, they are runoff, sediment and trash

producers that add to runoff complications instead of sharing control. Green infrastructure has high runoff, control potentials through promoting natural processes and enhancing conservation targets. Fig. (7).



Fig. (7) Raised green facility adding runoff.

4.2.9 Urban Forestry

Urban forests, green belts and buffers are in complete absence in Greater Khartoum that seemed to be prohibited luxurious city components. This status imposed loss of wide range of forest benefits including the high runoff control potentials [6] and [7].

technological and cultural constituents, stemming from lack of political will to adopt sustainable urban planning which is capable to tackle urban challenges and promote city's responsiveness and resilience. Consequently arose, lack of well-built institutional culture and capacity, coordinated institutional frameworks, inter-organizational coordination and collaboration, fairness and accountability and perfect public urban culture, which made up a package of deficiencies strongly supporting the runoff control problem. The

5- RESULTS AND CONCLUSION

The problem of storm runoff control in Grater Khartoum is a multifaceted problem including political, institutional,

solution, in view of the aforesaid causes is centered on availability of strong political will that, the political system, is willingly accepting to undertake sustainable urban planning, rectify the said package and commit to defend democratic and freethinking atmosphere for professional exercise. Bearing in mind that, climate change is another threatening challenge, it is an atmospheric mine that should be seriously considered in urban management and plan accordingly.

6- LITERATURE CITED

- [1] Khartoum Structural Plan, KPP5. 2010.
- [2] The National Records Office.
- [3] Gedalia Auerbach, 2012. Urban Planning: Politics vs. Planning and Politicians vs. Planners.
- [4] William Johnson, 1997. Urban Planning Politics.
- [5] The Concluding Report for the Committee of rains and floods Impacts Parrying, 2014.
- [6] McPherson, E.G. R.A Rowntree, 1991. The environmental benefits of urban forests.
- [7] Sanders,R.A, 1984. Urban Vegetation Impacts on the Urban Hydrology of Dayton Ohio. Urban Ecol. 9:361-376.

