



The Human Cost of Climate Change

Flood risks and management in urban landscapes

ASSAf Presidential Roundtables

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global **environmental** and **advisory** solutions



**DURBAN CHAMBER
OF COMMERCE AND
INDUSTRY NPC**

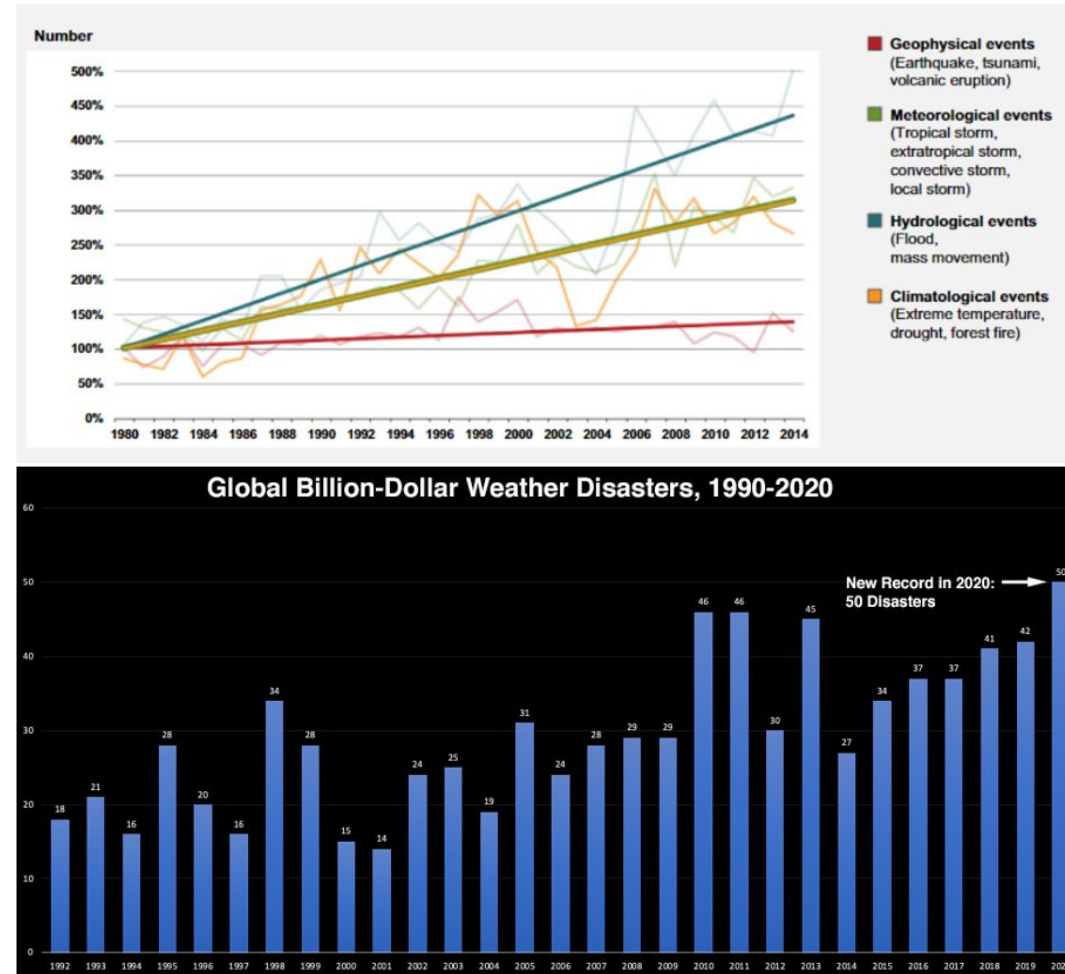


Climate Change

- Global warming is occurring as a result of increased green-house gas concentrations, which trap heat in the atmosphere leading to a rise in global surface temperatures.
 - CO₂ concentrations are highest in 800 000 yrs and increasing faster than ever.
 - The earth is 1.1 °C warmer on average than in the late 1800s.
 - The last decade (2011-2020) was the warmest on record.
- Beyond warmer temperatures, the world's climate is experiencing change. These include more intense droughts, water scarcity, severe fires, rising sea levels, intense rainfall and flooding, melting polar ice, catastrophic storms and declining biodiversity.
- The climate change effects vary in space and time across the globe and are experienced differently by different people/groups through risks to health and safety, the ability to grow food, housing and work.

Climate Change

- Some effects are long-term (protracted drought and desertification, sea-level rise, saltwater intrusion, regular flood risk). Areas become uninhabitable and whole communities have/will require relocation.
- Other effects are acute, resulting in natural disasters (flooding, storm surges, wild fires, water shortages).
- There has been an upward trend in weather events per annum, and in billion-dollar weather related disasters since 1992. Fifty were recorded in 2020 (Aon).
- The human costs are high



Climate Change

- As GHG emissions and atmospheric CO₂ concentrations increase, global warming is predicted to continue.
- The globe is currently on a 4°C average surface temperature rise trajectory (IPCC).
- Global leaders, cities, businesses, citizens, transnational initiatives and public-private entities are targeting a 1.5°C average surface temperature increase.
- The greater the rise in temperature, the greater climate changes are predicted to become (more frequent & higher intensity extreme heat, more frequent & higher intensity precipitation, more frequent & higher intensity drought, etc).
- The frequency and intensity of disasters linked to weather are predicted to increase dramatically, with related rise in economic and social costs.
- Some areas are already considered to be uninsurable.

SA Weather Disasters

- SA has experienced many weather disasters over time. Evidence that these are increasing in frequency and intensity.
 - Knysna fire (2017)
 - Western Cape drought (CT day-zero - 2018)
 - Gauteng floods (2019)
 - KZN floods (2022)
 - Eastern Cape drought (PE day zero - 2022)
 - Numerous significant weather events
- The economic and social losses of these disasters has been significant and is increasing.
- The recent KZN floods (April 2022) were SA's most costly weather-related disaster on record.



Causes of Flood Disasters

- Climate change is driving increases in weather-related hazards.
- In South Africa the following are predicted:
 - average surface temperature increases across the country, by as much as 3°C in the northern provinces of North-West and Northern Cape,
 - increase in heatwaves and extreme temperature days for all non-coastal settlements, and
 - more frequent and intense storms in KwaZulu-Natal (e.g. cut-off low systems), the Eastern Cape and Free State.
- As experienced in the KZN floods, climate change is the present, with extreme weather resulting in significant economic and social costs.
- Would addressing climate change prevent or manage these flood and the related costs??



Address climate change to prevent flooding?

- Global commitments on climate change are driving actions to limit the average temperature change to 1.5°C.
- Much attention and investment is currently focused on the need to limit carbon emissions (net-zero).
- If achieved, this will dampen the variability in weather extremes over what they could reach.
- However, CC actions are often removed from the local context and proof will only be evident in decades to come.
- High intensity rainfall is still likely/inevitable, as is flooding.
- For flooding, CC is a small piece of the pie, and a too narrow focus risks locking up resources and skills required to address other key causes.

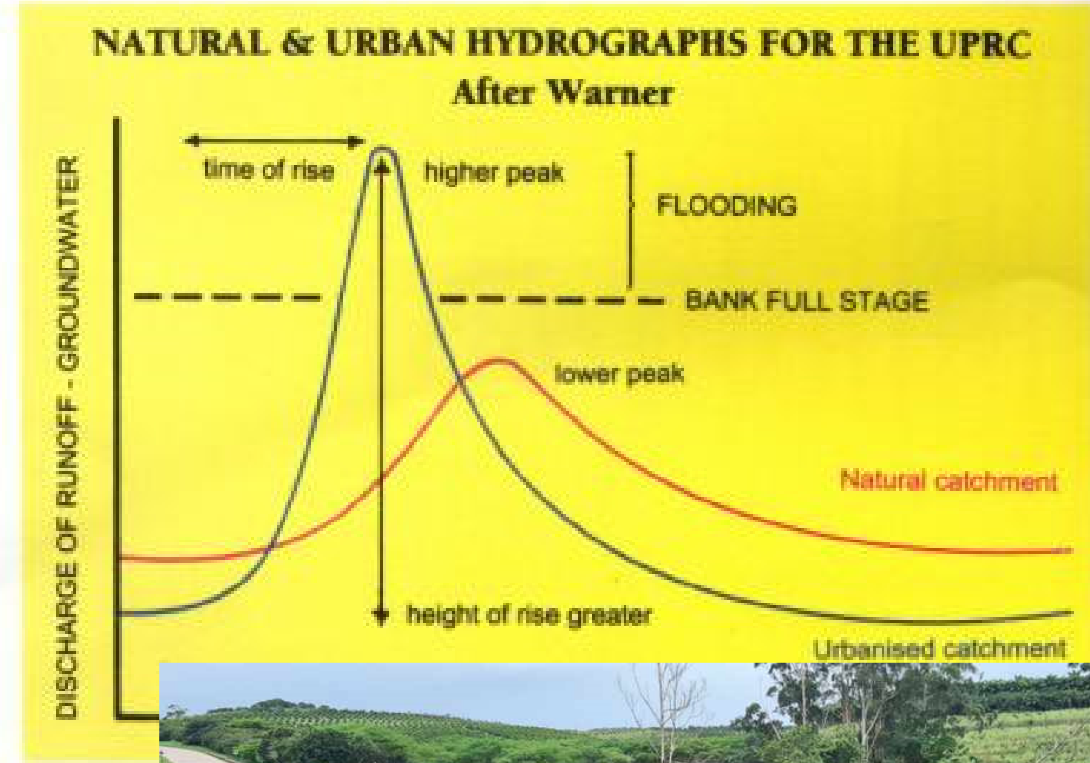
Other causes of

- Land use change
- Occurring across catchments in



NATURAL ENVIRONMENT

URBAN ENVIRONMENT



25% shallow

25%

- Encroachment into riparian zones and impediment
- Our water is contaminated



Other causes of Flood

- Infrastructure and commercial infrastructure design:
 - processes typically from
 - undertaking limited review
 - focus on delivering grey
 - generally not incorporating
 - working in isolation
 - have/will take place
 - Other contributors
 - » Low levels of input
 - the design capacity



Other causes of Flood Disasters

- Community exposure to weather hazards as a result of population growth, urbanization, and poor land use practices.
 - There are ~ 5 million informal dwellings in SA.
 - These are often of poor construction and located in marginal areas.
 - » Making them, and their inhabitants, prone to flood risk.
 - Historically low lying areas were undesirable and allocated to industrial/institutional development.
 - Limited warning systems and low trust in such systems.



Consequences of Flood Disasters

- The collective contribution of these causal factors over the next few decades to is likely to result in disasters of increasing frequency and intensity.
- Which more frequent weather events of increased intensity will exacerbate.
- In urban SA, these are possible nearly everywhere (CSIR, 2019), but more so in high-risk areas and more so by more vulnerable people/groups.
- Without meaningful interventions the economic and social costs will be significant and continue to escalate.



Improving flood management

- Catchment management:
 - Stop hardening surfaces, increasing water conveyance and creating point source discharges.
 - Improve storage capacity, throughout the catchments.
 - Provide for attenuation of longitudinal flows to diminish peak discharges
 - at different scales throughout the catchment and in light of ‘new’ weather and hydrological patterns.
 - Implement, maintain and expand riparian buffers.

Flood management

- Infrastructure and community vulnerability:
 - Adopt design models that consider higher variability in future rainfall.
 - Adopt climate adaptation approaches in planning and design.
 - Adopt catchment wide approach in assessing hydrological risks.
 - Improve town planning and implementation with stronger commitments to water and riparian zones.
 - Prioritize nature-based solutions over purely grey infrastructure.
 - Periodic review of existing infrastructure against 'new' hydrological regime.



Flood management

- Community exposure:
 - Reduce risks to downstream communities by:
 - » Improving catchment features
 - » Adjusting infrastructure to minimize encroachment and impediments
 - » Regular maintenance and repair of infrastructure
 - Remove industry and development from riparian areas
 - Remove communities from high-risk areas
 - Develop and implement trusted warning systems for risk areas

Flood management

- Successfully improving flood management/prevention measures will require the adoption of bold new thinking and policy and action!
- There are excellent institutions, projects and champions working in this space.
- However, there is still too little action, and ongoing ‘business-as-usual’ approaches.
- Property owners, business and municipalities need to accept increased costs in the present.
- Failure to do so will undoubtedly ensure that there is a significant “human cost of climate change”.

DISCUSSION



THANK YOU !



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