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"An Integrated Approach towards Drought Risk Reduction in Balochistan, Pakistan"

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Abstract:

It is valuable for the policy makers to configure and assess the impact of drought in a particular area having arid climate, remote rural settlements and history of prolonged drought spells. This study endeavours to suggest the policy guidelines on drought risk reduction basing on the assessment of drought impact in the study area Balochistan Province and recommendations measures to innovate drought monitoring and reporting methods using. The drought assessment results and spatio-temporal projections spanning over a longitudinal period of 37 years comprising precipitation and remote sensing data acquired through Standardized Precipitation and Vegetation Condition Indices (SPI & VCI respectively), are further deliberated to configure policy issues and finally streamlined to devise policy guidelines and measures to enhance drought risk reduction mechanism in the study area. Hence, the issues highlighted mostly draw out of lack of technological assistance, weaker focus on research and development towards drought assessment methods and a huge communication and information transfer gap between major stakeholders and the drought coerced population, all compounding into the unified role of management. Therefore, the study identifies drought trends of past 37 years in the study area and tends to suggest measures to enhance drought assessment while recommending steps to strengthen drought early warning and communication mechanism.

Key Words: *Disaster; Agricultural Drought; Drought Risk Reduction; Integrated Approach; Balochistan; Pakistan.*

Introduction

The disasters are usually caused by the presence of hazard; vulnerability conditions and insufficient resilience to retrieve from losses. The impact of disaster includes multiple losses including life, property, services and other significant damages of socio-economic and environmental nature. (UNISDR, 2009). Similarly, the disasters have deep rooted effects on the society, economy and environment of the area (Pandey, 2009). Correspondingly, (Domeisen, 1995) estimates the increase in financial losses caused by the disasters as three folds from 1960-80 across the globe i.e. from 40 to 120 billion US$. From 1990-96, the volume of the loss further upsurge reaching 400 billion US$. Only in United States, the natural disasters from year 1992-96, caused the damages worth 54.2 billion US$ per week (Carolwicz, 1996)

Drought is expressed as the most complex but least understood of all natural hazards, affecting more people than any other hazard (Hangman, 1984). . In the present world, the state of water is influenced by the artificial as well as natural processes. Resultantly, the droughts appear as a consequence of a complex interaction between meteorological anomalies, land surface processes, and human inflows, outflows, and storage changes (Van Loon et al, 2016). Similar to other disasters, the losses associated with drought are also increasing affectedly in economic, social, and environmental domains. (Wilhite, 2000). The drought can cause deficiency in both surface and ground water sources and consequently has consequences on crop production and livestock (Gommes & Petrassi, 1994). In a paper by (Osbahr et al, 2008), they further endorse that the agriculture is more vulnerable to drought impacts because of higher reliance on natural resources as compared to other economic sectors and it becomes challenging for agricultural communities to recover their economy after drought.

Drought is unlike other.natural.hazards.such.as earthquakes, floods, .tsunami and tropical cyclones due to various reasons. Firstly, it is difficult to ascertain the impact and culmination of drought. Secondly, there is confusion about a precise definition of drought which can be accepted universally. Thirdly, the effect of drought is unclear and has a

wider extent as compared to other types of hazards and it hardly results in any sort of structural damage. Therefore, due to above mentioned reasons the gauging of drought effects and subsequent relief work become even challenging tasks. Above in view, drought is repeatedly stated as a creeping phenomenon. Tannehill further maintains that there is no specific definition of drought and so is our knowledge about the phenomena (Tannehill, 1974). Even though his writing was compiled more than half century back, yet the climatologists work hard to find out the main causes of the impact of drought (Wilhite, 2000).

There is growing concern about the increasing frequency and severity of droughts in Pakistan (Shamsuddin S. et al, 2015). The phenomenon may be attributed to Pakistan's elongated latitudinal extent which gives rise to significant unevenness in seasonal rainfall. Resultantly, even a minor deviance in seasonal mean rainfall can affect the water shortage into socio-economic disasters for the country (Sheikh MM, 2001). In Pakistan, the drought has been observed to occur every four years in a decade (Anjum et al, 2012), while the Balochistan province remains as the most drought affected region. As per the records, some of the severe droughts years in Balochistan which produced shattering effects on the socio-economic condition of the communities include 1967–1969, 1971, 1973–1975, 1994, and 1998–2002. Particularly, the long-drawn-out 1998–2002 drought affected the rain-fed crop production by 60–80 %, irrigated crop production by 15–20 %, and perished nearly two million animals (FAO/ WFP, 2002); (Sarwar A, 2008).

Problem Statement

In the backdrop of 1997-2003 and 2013-2017 drought spells in Balochistan the severe extent of socio-economic and ecological devastations could be attributed to the assessment, monitoring and management of the disaster, if not the earlier, at least the latter drought spell.

Research Objective

To analyse existing drought risk reduction policy, identify weak links in the conception and implementation and suggest policy measures for drought risk reduction.

Research Plan and Methodology

The research has used an investigative approach to identify grey areas in the conception or implementation of drought DRR policy. Since, the study is based on the descriptive approach to review the policy on drought risk reduction in study area Balochistan, therefore the study focus remains maintained on the analysis of policy and recommended way forward.

Drought Profile of Balochistan

Balochistan is the largest province of Pakistan, covers almost 44 % of the country's land area (347,190 km2), with a population of about 8 million people (12 persons per sq km). Geographically, Balochistan extends from 22 o N to 32 o N latitude and from 66o E to 70o E longitude. The climate of Balochistan ranges from semi-arid to hyper-arid. Overall, annual precipitation ranges from 200 to 350 mm, and a significant proportion of this total fall is received in the form of snow and rain in the mid-winter or as intense shower in summer.

There are a total of 18 meteorological stations/ observatories of Pakistan Meteorological Department (PMD) and 23 Rain Gauge Stations of Irrigation Department in the province. Although, the data of annual rainfall is available for more than 30 years, but the desired accuracy may not be achieved through dependence on ground meteorological stations/ rain gauge stations data only. Therefore, in order to have better and accurate spatial coverage, reliance on Remote Sensing Based data and relevant indices is used as a modern day technique. A vast array of studies is available for the monitoring of agricultural drought through satellite acquired data and its conversion into practical indices.

National Disaster Management Authority declared that the results of climate change would continue to appear with more severity and recurrence in coming years (GOP NDMA, 2015). The drought of 1998-2002 is considered as the worst one in past 50 years of the country's climate history. Recorded rainfalls during this period remained very less over entire Pakistan as compared to preceding years. The Balochistan was the hardest hit province of this drought which directly affected 88% of its area. Agriculture and livestock sectors are the main components of the

provincial economy and employ about 67 % of the labor force and account for 50 % of the GDP (M. H. Hussain, 2004). Majority of the population (85 %) lives in rural areas in the province and agriculture is their main source of income (M. Ashraf et al, 2014). Occurrence of droughts is a common phenomenon related to Balochistan province; however, the multiyear recurrent drought during 1998–2002 was the longest dry spells and is considered as the most devastating in the history of the province. It damaged almost 80 % fruit orchards and affected 22 districts out of 29 in the province (GoB, 2007). In addition, 1.91 million people had been affected and of 9.31 million affected livestock, 1.76 million had perished during 2001 (Shafiq & Kakar, 2007). Farmers' agro-based livelihood was badly affected and the situation got worst due to poor farm water management and lack of controlled cropping patterns in severely or moderately affected areas. Crop areas have been reduced by 60–80 % with a productivity loss of around 50 % (Ahmed et al, 2004). In a joint study on spatio-temporal characteristics of drought in Balochistan by (M. Ashraf & J.K Routary, 2015), it was revealed that the spatial distribution of mild droughts (Figure 1) indicates that the mild droughts tend to occur more frequently across the province.

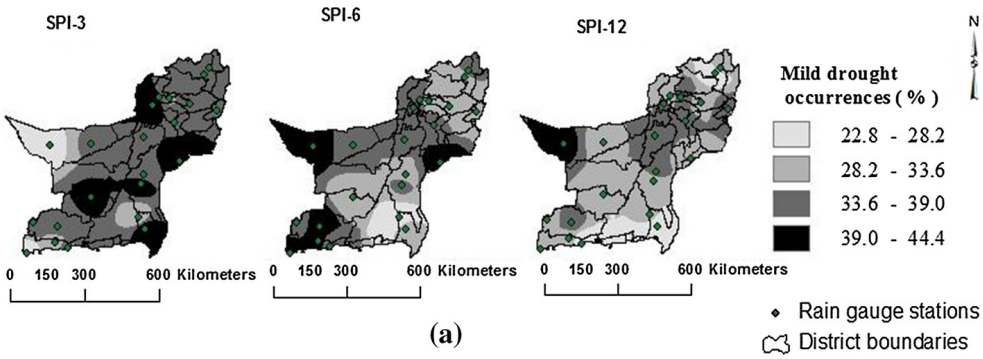

Figure 1: SPI Measurements, adopted from Spatio-Temporal Characteristics of Drought in Balochistan by (M. Ashraf & J.K Routary, 2015)

Drought Assessment Mechanism in Balochistan

The province of Balochistan being an under developed area with marginalized disaster risk management setups, has meager drought assessment and monitoring facilities. In most of the cases, the agricultural

drought based Early Warnings are generated by the farmers themselves rather than District Disaster Management Authorities (DDMAs). NDMA being the nucleus institution for drought early warning is itself dependent upon Pakistan Meteorological Department to monitor drought. Due to lack of its own network down to district level, the institute is dependent upon Civil Administration to handle disaster management functions and relies on forces to conduct response and relief operations. Meanwhile, the effort to link farmers with Agriculture department and collaborate towards drought mitigation and agricultural coping techniques in the light of meteorological monitoring, completely lacks in the PDMA functions. Similarly, the vastness of the area and remoteness of the widespread population would require extensive infrastructure for the ground stations to function appropriately. Moreover, the reliance on advanced technical features like remotely sensed data based drought assessment methods is still out of trend in Balochistan.

Existing Policy on Drought Risk Reduction

The disaster risk reduction may be defined as the systematic development and application of policies, strategies and practices to minimize vulnerabilities and disaster risks throughout a society, avoid (prevention) or to limit (mitigation and preparedness) adverse impact of hazards, within the broad context of sustainable development (UNISDR, 2009). The success of the National DRR Policy lies in the effective implementation of operational plans to be prepared and implemented by national and provincial governments in line with broad policy parameters. Most significantly, the role of F/G/S/PDMAs and district authorities will be the key to enhancing DRR capacities of line departments and at-risk communities. In the following section, an overall framework for implementation is recommended to facilitate the subsequent process of formulating detailed action plans (NDMA, National Disaster Risk Reduction (DRR) Policy, 2012).

So far the information dissemination mechanism serves as the weak link towards integrative risk reduction method in Pakistan specifically about relative vulnerability of various local areas (districts, municipalities) towards impending hazards. In the absence of such information it is difficult to identify priorities and make decisions on allocation of resources

for risk reduction. Risks and vulnerabilities are dynamic and they change over time and space. Therefore, it is essential to develop mechanisms and systems for continuous monitoring of hazard risks, and vulnerabilities. This instrument would enable decision makers at all levels to take effective decisions to develop risk reduction policies, strategies and programs (GoP NDMA, 2007).

The knowledge on 'Drought Risk' is as of yet lower in Pakistan. This applies both to the mapping and understanding of a number of key hazards and the underlying dynamics and causes (including climate change), and to the lack of sound data and analysis of vulnerability. Only a small number of risk assessments have been undertaken covering limited territory and hazards. There is no national standard methodology or institutionalized capacity to conduct multi-hazard risk or vulnerability analysis. This includes the absence of a standard for geo-spatial mapping which is an essential prerequisite for a national risk atlas. Hazard-data is spread out over several institutions at national and provincial levels (NDMA ,. , 2013). Its compilation and suitable dissemination to users is yet a challenge.

Major Stake Holders and their Roles

For a risk-sensitive development environment in Pakistan, the National DRR Policy reinforces that all the relevant ministries, departments, organizations and agencies will attach greater importance to integrating DRR considerations into policy, planning and programming at all levels. NDMA will facilitate the process of developing specific guidelines by engaging technical experts and organizing consultations with relevant entities at all levels. Planning for disasters and disaster risk management/reduction is a participatory process and will aim to involve a multitude of stakeholders from across government sectors, the private sector, NGOs, CBOs and communities. It would therefore be necessary to cluster stakeholders into planning groups relevant to the various activities associated with disasters and disaster risk management, e.g. hazard-specific contingency plans and operational plans, development of disaster risk reduction strategies, etc (NDMA, National Disaster Risk Reduction (DRR) Policy, 2012)

Pakistan has hands-on extensive experience in multi-stakeholder

collaboration on the reconstruction. The organizations partnered with local NGOs possessing prior experience in rehab work were further partnered in, social mobilization and community capacity building (World Bank, 2013). Various local, national and international NGOs have been instrumental in providing aid and humanitarian services. Pakistan Humanitarian Forum (PHF), representing 63 international aid organizations, has been active since 2003 to address humanitarian and development needs for vulnerable populations in Pakistan. NGOs have a pivotal role in providing a wide range of health and education and other services to millions of people in poverty in remote parts of the country. However, roles of NGOs, CBOs and people-organized groups are still peripheral in DRM domain and limited mostly to relief distribution. While platforms are established for coordination and joint initiatives such as through Disaster Risk Reduction Forum, a network of INGOs and NGOs, their engagement in mitigation and preparedness is not strong enough to advocate for policy change nor trigger responsive acts from the government (Fayaz et al, 2017). Potential of these actors have to be optimized through various coordinating platforms and mechanisms that enhance synergies and complementary of state and non-state actors.

With increased frequency and intensity of drought events, emergency response capacity and more amplified preparedness interventions have to be strengthened, especially for droughts as recurrent hazards. Moreover, for disaster risk reduction, actions should be emphasized by establishing coherent plans, with the division of functions and roles between multi-tiered DRM structures and concerned agencies at different levels (Fayaz et al, 2017). Revisiting DRM institutional arrangements and mandates at all levels should be prioritized to clarify the division of tasks and chain of incident command. While each district has formulated a District Disaster Risk Mitigation (DRM) Plan, putting the plan into action has been hampered in part by lack of resources (NDMA, 2015). Thus, addressing financial challenges is another critical area.

The challenges related to water security have reached their critical threshold. Various factors are acknowledged to be contributing to the situation; poor water data and information for water resource monitoring and management, weak processes for water resources planning and

allocation, absence of environmentally sustainable water utilization, widespread pollution, and low water productivity in agriculture (World Bank, 2013). Coupled with increasing flood and drought risks, sustainable water management by adopting multi-disciplinary solutions, with basin-scale multi-stakeholder water planning, will be crucial. Risk-sensitive spatial planning is still hindered by the lack of technical capacity, comprehensive disaster and climate risk information, and due to complex governance and urban development systems. However the plethora of government agencies involved in DRM and DRR at federal, provincial and district level as well as non-state actors provided both, opportunities as well as challenges. From DRR perspective, there is a lack of long-term planning for drought risk reduction and activities remain extremely centralized

Priority issues increasing the understanding of disaster and climate impacts in Pakistan is among the highest priorities due to lack of available baseline data, SADD and contextualized information stored in comprehensive and updated disaster information management systems. Furthermore, information should be made easily available to all sub-national level development planners and the private sector to mainstream the implementation of DRR and CR in all sectoral development. However, lack of technical capacity and resources are limiting the collection, analysis and management of disaster information at the lower levels of government. However, addressing the unavailability of local expertise and professionals in DRR is compulsory for the country to fully roll out the National Disaster Management Plan (NDMP) 2012-2022 into actions that address specific problems and needs of each locality. Also, building technical competency in conducting risk assessments, and capacity building on DRR, must be extended down to sectoral planners, local planning authorities, town planners, and data and statistics management agencies especially at provincial and district level. DRM architecture in Pakistan has improved in terms of scale and quality. However, participatory approaches and work modality with non-state actors must be further enhanced. Continued awareness-raising and promotion of people-centric DRR should be mainstreamed in all DRR and climate interventions. More up-scaled actions are required to empower people in inclusive disaster preparedness and mitigation, enhance coping capacity and livelihood diversifications,

and to promote the application of climate change adaptation among vulnerable populations. In this regard, concerned government agencies will be a key driver of the process by providing necessary provision and imparting technical know-how to the communities, alongside building ownership and trust among diverse population groups, based on mutual DRR benefits.

Suggested Policy Measures

- **Research and Simulation Studies**

In order to acquire better knowledge and equip the stakeholders with modern analysis tools, there is a need to promote research on drought in the key institutions and departments with a view to introduce contemporary drought risk reduction models to the province. The vulnerability models may be then simulated to test the efficacy of research tools and existing risk reduction structure through simulation of drought situations in varying timescales.

- **Drought Monitoring and Concurrent Vulnerability Analysis**

Drought monitoring is the key to drought assessment and hence requires modern technological assistance in order to acquire error free drought picture. The monitored/ observed anomalies are then projected on a future timeline to obtain drought forecast. Subsequently, the forecast is overlaid on the pre-identified vulnerable areas keeping in view the climatic conditions to work out a comprehensive drought assessment picture. Balochistan requires such an elaborate drought mechanism to forestall any eventuality of the drought in the future.

- **Integrated Organizational Platform**

Drought is an all-encompassing phenomenon that involves almost a national level response to mitigate its effects while our National DRR Policy very briefly covers the subject drought management. Therefore in order to generate a national level response there is requirement to integrate all stakeholders at an integrated organizational platform with NDMA in the leading role. The structure should then define roles and impart subsequent sequential tasks to PDMAs/ DDMAs, PMD, Research Institutions (National Disaster Research Institute, Agriculture Research Institute and

PMD Research and Development Division), Line Departments, NGOs and Media for a collaborative output.

- **PMD Drought Bulletin and Farming Guide in Balochistan**

PMD is currently running a farmers bulletin for Punjab, Sindh and KPK provinces while there is a need to educate and update the farmers of Balochistan as well. A basic framers guide and bulletin delivered in local languages can update the knowledge level of farmers on agricultural pursuits. Similarly, farming related query session answered by agricultural and meteorological experts can help generate a two way communication and transfer of information between the rural communities and organizations.

- **Effect Based Media Campaign**

The drought DRR policy in line with drought mitigation efforts and technological improvement should also consider including a parallel social media campaign and FM Radio transmissions on the subject of drought risk reduction to target the remotely settled audience and rural population. A test transmission in this regard can be started by Radio Pakistan by the name of 'Kisan Sangat' (Farmers' Friend) to see the response of local farmers.

- **Targeted Plantation Drives**

The country wide extensive plantation drive is aimed at reducing the adverse effects of climate change in the environment. Balochistan province has a limited plantation period and has only one major season of plantation during spring. As witnessed during the research results that majority parts of Balochistan suffer from moderate to severe drought of thre to six month timescale, in such circumstances dispersed plantations would not be able to contribute into affecting climatic changes. However, taking the example of designed plantation projects, where bulk plantations are supported by artificial or natural water reservoirs, may tend to bring positive results towards the local climate of the area. Pizoi forest in Chaghi (lat: 28.819644; long: 64.830056) and Shalimar triangle in Quetta Cantonment (lat: 30.213511; long: 67.060718) are cases in point where the

author has selflessly contributed towards sustainable plantation projects supported through water conservative channels.

Conclusion

Drought is a complex phenomenon requiring elaborate assessment and monitoring mechanism. In case of subsequent detection, this further requires readily available risk reduction plans with resources in place for smooth conduct of mitigation and rehab programs as per the category, frequency and severity of drought coercion. Such an ideal implementation of DRR policy entails thorough planning and extensive preparation involving all major stakeholders as well as vulnerable communities in order to adopt and follow an integrated approach towards drought risk reduction in Balochistan.

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