

# The Problem Of Urban Development On Flood Risk In Sind And Balochistan Provinces With Focus On Small And Intermediate Urban Centers

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**Abstract**—This study analyses 4 fatal flood events from different Area of North Western Sind and Balochistan cities. The case-specific flood disaster-related data mainly categorised into flood characteristics, socio-economy, disaster preparedness, emergency response and impact are collected from the concerned authorities in each country. Data for all selected flood events are compiled and compared to check the seriousness of the flood problem at different localities in the selected regions. At least one flood event from each main cities, Sakar, Khairpur, Jakomabad, And Nasirabad is considered. The analysis was divided into three parts: (1) flood impact sector analysis, (2) flood human death cause analysis and (3) flood disaster critical cause and effect analysis. The result shows that the majority of flood-related deaths was mainly caused by drowning, which accounts 44% of flood deaths. Despite the evacuation advisories issued in 65% cases, many people stayed at homes either due to the lack of timely available information or due to confusion about the reliability of provided information or ignorance or overconfidence with their safety. In many cases, the early warning information did not reach to the community because of the lack of appropriate communication mechanisms. Most of the areas were protected by some levels of structural measures such as levees, but the quantity and quality of such measures are not sufficient and are not often linked to non-structural measures. Large-scale floods acutely impacted on public infrastructures. The worst hit sector was transportation.

**Keywords**—Flood, Disaster, Management, Risk, Hydrology and Mitigation.

## 1. Introduction

Flood disaster management, which involves prevention, mitigation, preparedness, response and rehabilitation efforts, has been discussed for a long time. In short, such management tools can be classified into before, during and after event activities within the scope of disaster risk management cycle, for which the flood disaster preparedness can be

referred to all measures to prepare before the events. Although all preparedness activities aim at reducing the flood damage, on-site practicality, which concerns the full utilisation of the capacities, particularly at the time of flood emergency, has not much been discussed [1]. The efficiency of adapted system can only be evaluated after the disaster event; however, the lessons learned from the past events can help enhance the defence system in normal time and the study area was shown in figure (1).

Despite the fact that significant efforts have been given by many South and East Asian countries to improve the situation by shifting the paradigm from reactive to proactive, approaches currently used are still not integrated and do not focus on dynamics of flood-related problems [2]. The prevailing approaches of flood risk management, particularly in developing countries, have always been questioned for their efficiency and effectiveness mainly in risk identification, project planning and designing as well as transparency and institutional capacities as elaborated. In order to estimate the increment in the flood risk, research studies have focused mainly on the characteristics of flood hazard especially for chosen rivers and flood plains. These studies include, but are not limited to, the effects of an increasing rainfall trend on peak flows upstream–downstream consequences, including infrastructure development, land subsidence, river channel contraction and bed aggradations and so on. However, equally important is the understanding of demography, human development, governance, and other socioeconomic and political factors. The mentioned factors have been considered in vulnerability analysis. However, it is important to note that an increase in flood risk often results from multiple dynamic factors working at the same time in a multifaceted manner. Therefore, increase in flood losses can be attributed to changes in each or combination of these aspects, which can be evaluated based on the lessons learned from the past events [3].

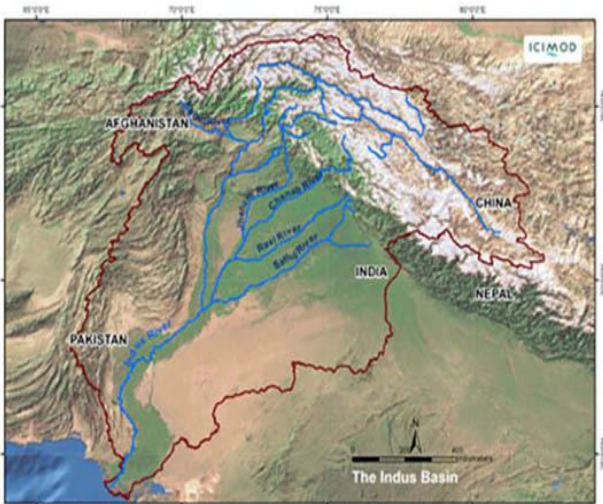


Figure (1) The Area of Study in Sind And Balochistan Provinces South West of Pakistan.

## 2. Materials and Methods

The study was conducted in Indus River in Sind and some part of Balochistan provinc. The area is located near the Eastern of Iran and Western of Pakistan. Thus location up on which this study concentrates is bounded by the coastline of Oman and Western of Pakistan, approximately, by the line of latitude 26 degree to the South and the line of longitude 60 degree to the west. The area consists of an inland chain of steeply sloping bare rock (mountains) which drain onto a coastal alluvial plain. The analysis is based on a multi-sites analysis approach, since the Indus river locations are not considered sufficiently similar to be pooled together. The area is located near the borders of Iran and Pakistan [9]. Thus location up on which this study concentrates is bounded by the coastline of southern Iran and Western of Pakistan, approximately, by the line of latitude 25 degree to the South and the line of longitude 60 degree to the west. The area consists of an inland chain of steeply sloping bare rock (mountains) which drain onto a coastal alluvial plain. The analysis is based on a multi-sites analysis approach, since the river locations are not considered sufficiently similar to be pooled together which is shown in figure (2).

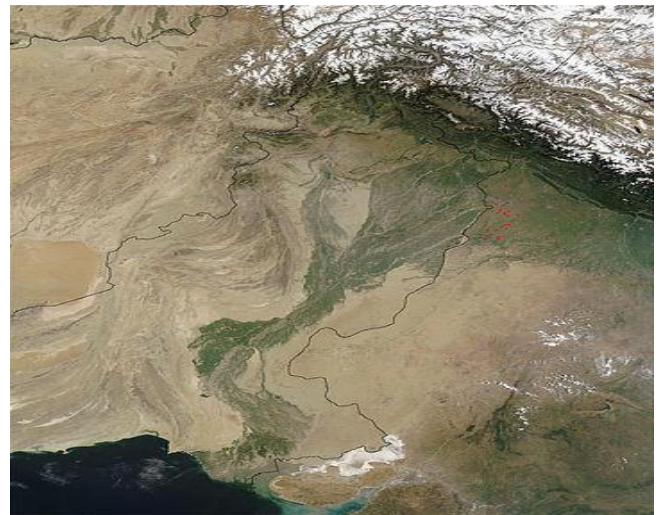


Figure 2. Indus River in Sind Province in Pakistan.

## 3. Problem Overview And Research Methodology

Southeast Asia is currently being considered as a high-growth area, both from the population and development perspectives. The escalation of severe natural, especially hydrological, disasters, mainly flood, storm, drought and landslides, is undoubtedly among the most prevailing obstacles for socioeconomic development and poverty-reduction initiatives in this region.

Asia tops the world record of flood disaster fatality and accounts major portion of world economic loss because of flood disaster. It is a fact that the increasing number of flood disasters corresponds to the accelerated trend of flood disaster losses associated with both hydrological regime and socioeconomic changes. The number of disastrous hydrological events in selected South and Southeast Asian countries is shown in Figure 3, which indicates that a number of hydrological disasters, particularly flood events, are increasing every year [11]. It is widely considered that economically disadvantaged countries and communities are highly vulnerable to flooding. The regional study conducted by the authors found that the population density, public awareness and good governance are the prime flood risk factors, which have high correlation with the number of flood fatalities. Although national statistical data were employed for mentioned regional study, it was not clear what parameters are crucial for flood damage at the local levels [12]. Therefore, it was essential to evaluate individual disaster events and conduct a comparative study to figure out the governing flood risk factors.

For each five year period between 1950 and 2015, Sind had the fastest urban population growth rates among the world's regions – driven by high rates of natural increase and net rural to urban migration. But part of this is due to most Sind nations having much lower starting points; Sind was much the least urbanized region in 1950 [13]. But Asia has had a more rapid rate of change of the percentage urban



from 1990. Sind urban population was 18 million inhabitants in 2010 and is projected to grow to 46 million by 2030; it was just 9 million in 1950. In 2010 it had one mega-city (Karachi with 9 million inhabitants) two very large cities (Karachi with 15 million and Hyderabad with 5 million), 5 large cities with 25 million urban dwellers in the region lived in urban centres with less than 25 inhabitants including a substantial proportion in urban centres of less than 200 inhabitants. Not surprisingly, the nations with the most large cities are generally those with the largest rapid rate of change [8].

#### 4. Hydrological disaster trend in selected cities.

The selection of country in this study was based on the ranking of highly flood vulnerable countries in southern and eastern Asia. The final selection was made to maintain the appropriate proportion of low-income countries and the countries in economic transitions for reasonable comparison [8]. General information on geographical features, mainly river system and potential flood extent, in each selected country are briefly summarized. But floods do not have to result in death and destruction, Inspector General of Forests at the Ministry of Climate Change: If only we can see it as an opportunity and learn to adapt to the annual floods instead of controlling them [9]. Protecting forests and natural resources can significantly reduce flood risks, he says. This means developing new laws and implementing existing ones to protect the environment, along with strengthening flood early warning system and restricting development in floodplain zones. Such measures have been missing from Pakistan's flood management strategy so far [10].

At first, new approach to floods was met with incredulity by most legislators: It was simply beyond their comprehension that was welcoming floods, they told the third pole net. But now that Pakistan's government is drafting its fourth national flood prevention plan, things may be set to change. While agriculture and housing have encroached on large areas of the Indus floodplains – some experts estimate as much as 50 per cent of the basin – there is still plenty more land where flood water from the Indus can be drained [10].

The experts identified sites such as parks as well as those along Hyderabad and Sukur barrages in Sind province. Well known hydrologist agrees that unless forests in the watershed and along rivers are protected the destruction caused by floods will continue which is shown in figure (3 and 4).



Figure (3) shown flood disasters in Pakistan.



Figure (4) shown flood disasters in Sind province.

#### 5. Small and intermediate urban centres

Internationally, growing interest in urban centres other than large cities comes in part from a recognition that a significant and usually growing proportion of national and urban populations live in urban centres other than the largest cities. In part, it is fuelled by a concern for the weakness of local government in most such centres. For some government, the interest in these urban centres is also about the issue of whether promotion of these (or some of these) urban centres would slow migration flows to large cities. Defining small or intermediate urban centres is problematic [7]. For instance, does this depend on population size, economic activity or administrative importance? Dowe use universal definitions of small and intermediate urban centres or definitions adjusted for each nation so small

population countries have different definitions? There are also the difficulties of the different definitions used by nations for what constitutes an urban centre and political reasons why a settlement does or does not become an urban centre (being 'rural' or 'urban' may determine access to different types of funding, for example), [5].

For each five year period between 1950 and 2015, Sind had the fastest urban population growth rates among the world's regions – driven by high rates of natural increase and net rural to urban migration. But part of this is due to most Sind nations having much lower starting points; Sind was much the least urbanized region in 1950 [1]. But Asia has had a more rapid rate of change of the percentage urban from 1990. Sind urban population was 18 million inhabitants in 2010 and is projected to grow to 46 million by 2030; it was just 9 million in 1950. In 2010 it had one mega-city (Karachi with 9 million inhabitants) two very large cities (Karachi with 15 million and Hyderabad with 5 million), 5 large cities with 25 million urban dwellers in the region lived in urban centres with less than 25,00 inhabitants including a substantial proportion in urban centres of less than 200 inhabitants. Not surprisingly, the nations with the most large cities are generally those with the largest [4].

#### 6. Infrastructure and service deficits and health risks for urban populations

The very large annual increment in the urban population (and in the population of most major cities) should not be a problem if the competence and capacity of their governments also grows. But it is where metropolitan, city and municipal governments lack the capacities to fulfill their responsibilities – for infrastructure, services, land-use management and accountability to their citizens (including decisions about funding priorities). Most cities in Sakar, Khairpur, Nasirabad and Jakomabad have very limited revenue bases [19] – and so depend on national government and international agencies for needed funding that usually does not come. Most national government have been reluctant to fund urban initiatives or urban government, sometimes for political reasons (e.g. most members of parliament with rural constituencies or urban centers governed by opposition parties) and sometimes for spurious reasons (for instance the belief that cities are parasitic or that very little poverty is in urban areas). International funding agencies have also given a low priority to addressing urban problems and the lack of capacity among urban government in the region [18].

This help plain why large section so Sakar, Khairpur, Jakomabad and Nasirabad urban population face very large health burdens associated with a lack of risk reducing infrastructure and services, including very high infant, child and maternal mortality rates [6]. The causes include very poor quality and overcrowded living conditions and the lack of provision for safe, regular, affordable water, good quality sanitation and household waste collection, health care, schools

and emergency services. These in turn are linked to the inadequacies in local governments who often refuse to work with those living in informal settlements, even as these house half or more of the population of many Sind cities [17].

#### 7. Results and Discussions

In many cases, the early warning information did not reach to the community because of the lack of appropriate communication mechanisms. Most of the areas were protected by some levels of structural measures such as levees, but the quantity and quality of such measures are not sufficient and are not often linked to non-structural measures. Large-scale floods acutely impacted on public infrastructures [18]. The worst hit sector was transportation.

These results imply the importance of mainstreaming disaster risk management in the development sectors. Mainstreaming flood disaster risk management in the development sectors does not necessarily mean to only protect the hard gained development but at the same time to accelerate and enhance the effort of building resiliency and therefore the socioeconomic development by better planning and designing of any kind of infrastructures in the flood plain areas. The findings from this study are helpful in identifying, prioritising and coordinating the measures for the effective flood risk management at the localities [20].

The result shows that the majority of flood-related deaths was mainly caused by drowning, which accounts 44% of flood deaths. Despite the evacuation advisories issued in 65% cases, many people stayed at homes either due to the lack of timely available information or due to confusion about the reliability of provided information or ignorance or overconfidence with their safety [15]. It describes how a substantial proportion of national (and urban) population lives in small and intermediate size urban centres (and thus not in rural areas or large cities) and considers what we know about risk in these urban centres and the implications for development [16]. The paper suggests that within the region's urban population, inadequacies in provision for basic infrastructure and services are usually larger, the smaller the urban centre. Most small urban centres in the region have local governments with very little capacity or funding to fulfil their responsibilities for risk reducing infrastructure and services [17]. Of these, the inadequacies in provision for water and sanitation are the best documented. But in some instances, provision for water and sanitation is so poor in large cities that the proportion of their inhabitants lacking adequate provision is as high as those living in small urban centers [18].

#### 8. Conclusion

The main urban issue that Sind is facing is rapid growth in its urban population without the urban governance structures in place that can meet their responsibilities and manage the change. This has



created very large deficits in infrastructure and service provision which exposes much of the urban population to high levels of risk. Without competent, effective and accountable urban governments, it is not possible to tap the great potential that cities have for supporting good living conditions and good health. This paper examines both the scale of urban change and the development challenge facing sub-Saharan Africa's urban areas and the possible implications on risk.

Protecting forests and natural resources can significantly reduce flood risks, he says. This means developing new laws and implementing existing ones to protect the environment, along with strengthening flood early warning system and restricting development in floodplain zones. Such measures have been missing from Pakistan's flood management strategy so far.

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