

CHAPTER 3 HYDROLOGY AND RIVER MORPHOLOGY

3.1 Flood Types in Bangladesh

3.1.1 Flash Floods

Flash floods rise and fall rapidly, usually within a few days. They may also flow rapidly along river channels and over the land. Water-levels in some eastern rivers can rise by several metres within 24-48 hours. Flash floods are caused by run-off during exceptionally heavy rainfall occurring over neighbouring upland areas. They occur most frequently-sometimes several times a year - on the piedmont plains adjoining the Northern and Eastern Hills. (See Map A3.1-1) They also occur on adjoining floodplain areas particularly in the pre-monsoon season before these regions normally become flooded from the rivers or by rainwater.

Flash floods do not necessarily cause extensive damage to crops or property. For crops, it is their timing which usually is most important. Early floods (in April-May) generally cause most damage, because this is when the boro rice crop is grown in piedmont basin sites and in adjoining floodplain regions. Damage is reported in some part or another of these eastern regions virtually every year; and in 1977, exceptionally heavy rainfall in the first week of April caused floods which destroyed virtually the whole boro rice crop (especially local varieties) in Sylhet District

Damage to property - especially road and railway embankments and bridges, and buildings alongside river channels - occurs during exceptionally high flash floods, more frequently in the east of the country than elsewhere. Flood embankments along some eastern rivers are breached by floods almost every year. Cultivated land adjoining such breaches may be buried by infertile sand. Land adjoining hill-foot streams is also sometimes buried by sand.

3.1.2 River Floods

River floods result from snow-melt in the high Himalayas and heavy monsoon rainfall over the Himalayas, the Assam Hills, the Tripura Hills, and the upper Brahmaputra and Ganges floodplains outside Bangladesh. They can be aggravated by heavy rainfall occurring simultaneously over floodplains adjoining the major rivers within Bangladesh. As in 1987, and by high Spring tides blocking outflow into the Meghna estuary, as in 1988.

River floods particularly affect active floodplains along the Teesta, Brahmaputra-Jamuna and Ganges rivers and alongside smaller rivers in other regions. (See Map A3.1-1) In years when river levels rise earlier or higher than normal, river water also extends to varying distances over neighbouring river meander floodplains that are normally flooded by rainwater, especially on the Jamuna and Low Ganges River Floodplains and in the north-east of the Ganges Tidal Floodplain. In the exceptionally high river flood in 1988, river water spread over virtually the whole of the Jamuna and Low Ganges Floodplains, but over only parts of the Old Brahmaputra and the High Ganges Floodplains.

The annual floods passing down the Brahmaputra and Ganges rivers normally do little damage, except by riverbank erosion and sometimes by the deposition of thick layers of sediments on some adjoining cultivated land. At an average interval of about 3-4 years, river floods extend beyond the active floodplains and cause damage to crops on parts of the adjoining meander floodplains, mainly along distributary channels. However, as is described more fully in the following section, the timing of the flood and sometimes the duration of flooding are as important determinants of crop damage as is the absolute height reached by a particular flood.

Peak flood levels in the Brahmaputra-Jamuna river normally occur about end-July, about a month earlier than those in the Ganges, and floods may affect one river system without affecting the other. High floods in either of these rivers may cause damage alongside the Padma and lower Meghna rivers. Overland flooding is particularly severe in years when high flood peaks in the two major rivers coincide, as they did in 1988.

3.1.3 Rainwater

Rainwater floods are caused by heavy rainfall occurring over floodplain and terrace areas within Bangladesh. Heavy pre-monsoon rainfall (April-May) causes local run-off to accumulate in floodplain depressions and in the lower parts of valleys within the Madhupur Tract. Later (June-August), local rainwater is increasingly ponded on the land by the rising water-levels in adjoining rivers. Thus, the extent and depth of rainwater flooding vary within the rainy season and from year to year, depending on the amount and intensity of local rainfall and on contemporary water-levels in the major rivers which control drainage from the land.

The serious 1987 flood in north-western parts of Bangladesh was mainly caused by excessive rainfall occurring over the north of the area almost throughout the monsoon season; but it was aggravated at times by flash floods passing down the Teesta and other rivers entering from the north-west, and by high levels in the Jamuna and Ganges rivers which blocked outflow from the Hurasagar river which drains about 80 % of the north-west region.

3.1.4 Tidal Floodings

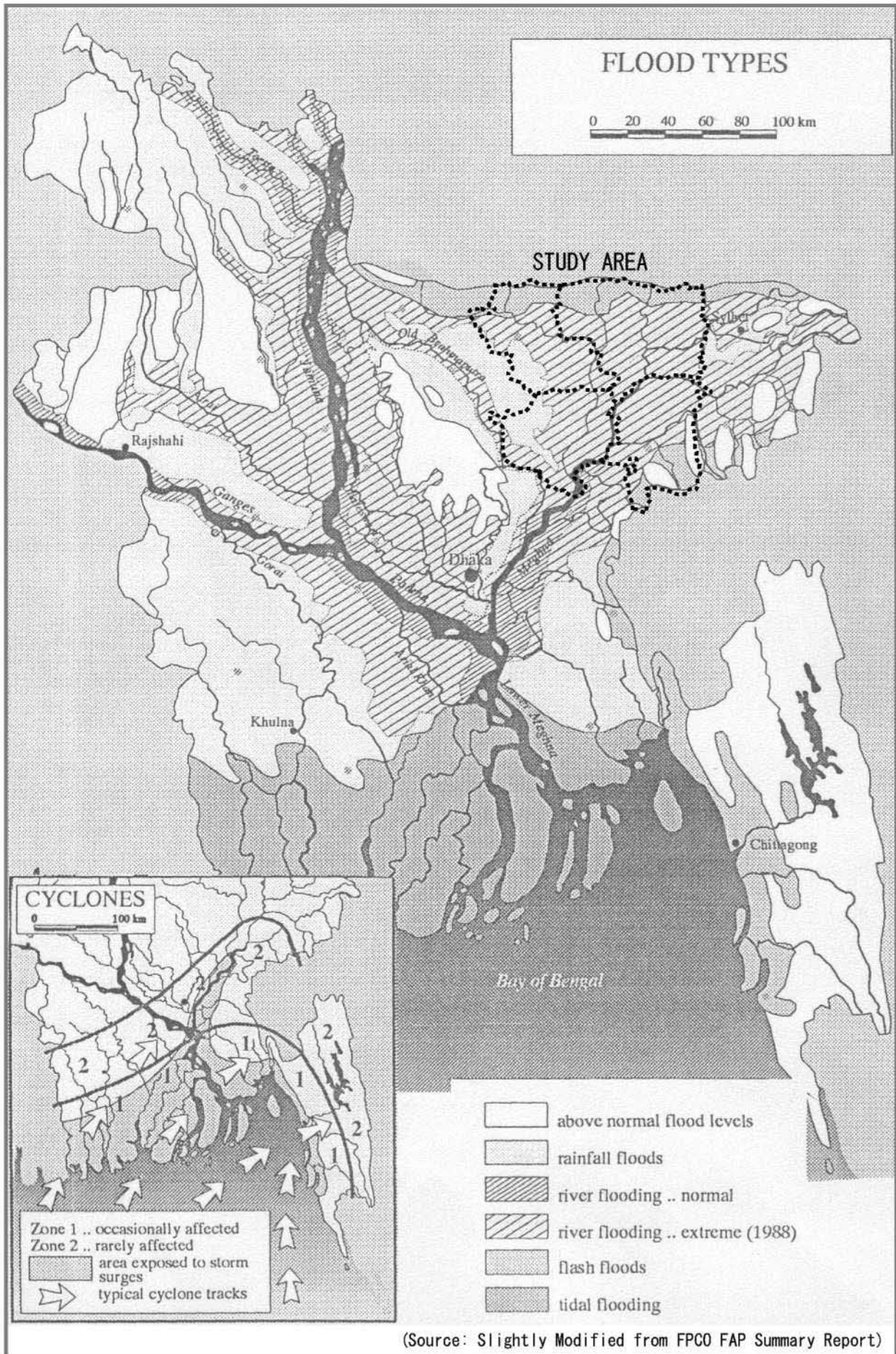
Tidal floodings are raised sea-levels caused by a combination of reduced barometric pressure and strong onshore winds associated with tropical cyclones. They cause sudden, but temporary, flooding of coastal areas with sea-water or brackish estuarine water for a few kilometres inland during the passage of cyclones, and are responsible for most of the casualties caused by cyclones. Exceptionally, as in May 1965, storm surges pass up the Meghna estuary as far inland as the south of the Sylhet Basin, flooding adjoining land with non-saline river water.

3.1.5 Man-made Floods

Man-made floods are induced by human interventions in the environment. There is little recorded information on such floods in Bangladesh, but the potential for such floods exists and the risk of

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them occurring must be expected to increase with the expanding number of major water-control projects.



Map A3.1-1: Flood Types in Bangladesh