

### 1. Flood Proofing

**Floods** are a natural event and only become a hazard when they affect people of property. People have chosen to build their homes close to the river and can take precautions such as:

- ☛ *house design which raises the floor level above normal flood heights;*
- ☛ *interior room design which minimizes flood damage, e.g. tiled floors;*
- ☛ *light furniture which can be quickly and easily moved upstairs should a flood occur;*
- ☛ *Removable flood walls that can be opened in summer to provide a river view.*

Local authorities are now controlling the location of new buildings and the construction methods used, so that buildings are able to cope with floods when they occur.

### 2. Dams and Reservoirs

Built upstream for hydro-electricity and to regulate river flow. The aim is to help *prevent flooding* and to release water gradually in times of low rainfall in order to make the river navigable all year round.

**Dams** are multipurpose schemes which:

- |                                    |                                 |
|------------------------------------|---------------------------------|
| ☛ <i>control flooding</i>          | ☛ <i>increase afforestation</i> |
| ☛ <i>provide a water supply</i>    | ☛ <i>reduce soil erosion</i>    |
| ☛ <i>produce hydro-electricity</i> | ☛ <i>encourage industry</i>     |
| ☛ <i>improve navigation</i>        | ☛ <i>encourage tourism</i>      |

### 3. Flood Retention Basins and Impounding Dams:

'**Impounding Dams**' are valleys filled with water which provide drinking water, produce electricity or supplement low flows. The water stored in impounding dams is drawn off from flood waters and during flood periods the water is merely moved for a time from one place to another. 'Flood Retention Basins' are only filled with water during periods of flood, after which they are emptied in order to be ready for the next flood.

---

---

#### **4. Increasing the Height of the Levees**

---

---

It has been suggested that higher embankments should be built and the river deepened but, where this has been done, (e.g. the Mississippi) it has produced rivers flowing many meters above the surrounding floodplain. As the levee is built up, sediment in the river grows too; the river beds – and the water levels rise. This leads to disaster when the barriers collapse.

---

---

#### **5. Flood Relief Channels**

---

---

To siphon off the Rhine flood water when the delta near the sea becomes overloaded.

---

---

#### **6. Making the Course Straighter and Shorter**

---

---

This aims to get rid of the flood water as quickly as possible. By shortening the distance, navigation is made easier, but the gradient and therefore the speed of the river is increased.

---

---

#### **7. Afforestation**

---

---

Trees delay and reduce the amount of water reaching the river.

---

---

#### **8. Floodplain Land Use Zoning**

---

---

Land can be zoned for uses that will not be damaged by winter floods e.g. pasture, forestry and parks

---

---

#### **9. Floating Towns**

---

---

The Dutch are pioneering floating towns to cope with rising tides and river flooding. In the short term, however, floating houses are no replacement for conventional flood defenses.

---

---

#### **10. Room for the River**

---

---

This reflects a new philosophy that humans should adapt to the shape of river basins that naturally result from flooding histories. This programme is currently being translated into land use change and relocation of inhabitants and dykes on certain floodplains. Arable land is being converted to forest, marsh or wet grazing meadows. Inhabitants are being relocated, with compensation, to higher elevations, and dykes are being relocated back from the main channel such that the entire floodplain cross section can accommodate a much larger volume of water.

---

---

---

---

### **Immediate Measures/Steps to be taken** (*\*Considering the Perspective of Bangladesh*)

---

---

- ④ An increase in 'water meadows' is to be done which can be allowed to flood when necessary. The sealing of the soil surface with tarmac or concrete in vulnerable areas is being limited to slow the water runoff into the rivers.
- ④ Ground coverage of vegetation with woodlands and grasslands is to be increased.
- ④ The use of fertilizers on soil is to be very carefully monitored because these affect the soil structure and its ability to retain water.
- ④ Adequate maintenance of dykes and flood walls.
- ④ To allow more space for trees on the floodplain, meters of silt accumulated over many years has been stripped and deep trenches constructed. (See diagram below).

---

---

### **Natural Flood Management**

---

---

Natural flood management offers a sustainable approach to managing floods and is intended to complement traditional "hard engineering" techniques, such as flood barrier and concrete walls.

These schemes rely on a combination of small-scale interventions with the aim of reducing the speed of the flow of converging water before it reaches larger rivers.

Natural flood defense features include small barriers in ditches and fields, or notches cut into embankments, all of which divert the water into open land.

Letting pools form outside the main channel of the river means the water is temporarily removed from the main flow reducing the power of the floodwaters.

***Trees can also help defend against floods.*** Planting more trees catches rainfall and helps take water from the soil - although the Environment Agency says large areas must be reforested to make a real difference.

Felled trees can also be laid across streams in wooded areas and help push unusually high waters into surrounding woodlands, although such schemes need very careful planning and management.

---

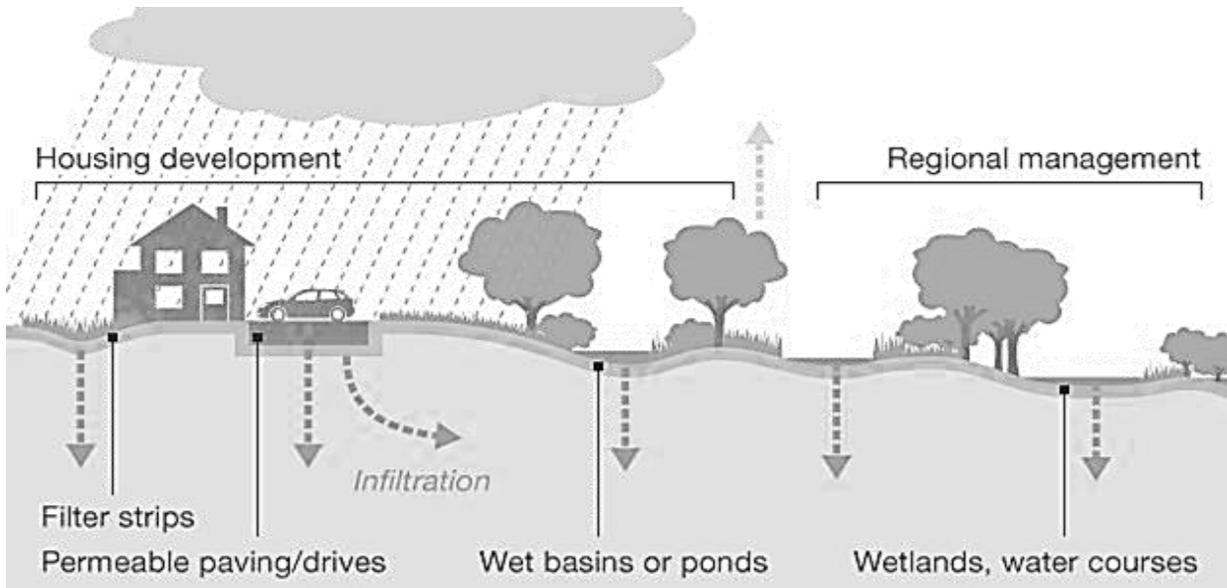
---

### **Sustainable Drainage**

---

---

***Sustainable drainage*** is a concept often applied to towns and cities which are especially prone to flash flooding after sudden heavy rain.



**Fig. : Drainage Management**

In urban areas, large areas of concrete and tarmac, as well as the roofs of buildings, are impermeable to water. Rain is channeled straight into drainage systems which can quickly become overwhelmed.

*In the UK, the Flood Act of 2010* obliges builders to landscape developments so that water from roofs and driveways seeps into open ground rather than rushing into the water system. This system can be followed to develop the present condition.

Sustainable drainage guidelines suggest that impermeable surfaces should be replaced with permeable material, allowing rainwater to drain into the ground - a process known as infiltration.

Large "detention basins" can also be built to collect rainwater and hold it, managing the volume of water entering urban rivers, while ponds offer further water-holding capacity.