"Should Bangladesh buy .U.S. technology to protect itself from floods?"

Introduction and background info

Hosting a population of around 140 million people, Bangladesh is the most densely populated agric ultural country in the world. Physically, it is a small, low-lying, riverine country which is situated in South-East Asia (it is 55,599 sq miles large). It borders the Bay of Bengal, between its neighbours Burma, in the in the South-East and India, in the North-East. Its terrain is mainly flat, with hills scattered sparsely in the South-East. Bangladesh is located in the world's largest flood plain and delta-the Gangetic Delta. This is made up by the confluence of the Ganges (Padma), Brahmaputra (Jamuna), and Meghna Rivers and their tributaries which empty into the Bay of Bengal for irrigation purposes as well. In addition, 90% of landmass less than 10 m above sea level, which makes the country very prone to flooding- in fact it's one of the most flood prone country's in the World.

The climate of the country doesn't help Bangladesh's situation, infact it plays a major part in hindering it. The climate's typically tropical, hot, and humid in summer (March-June), cool, rainy monsoon (June-October), and cool and dry in the winter (October-March). Bangladesh has many regular occurrences of cyclones, storm surges, and therefore floods, due to the climatic conditions. Aside its flood prone geographical position, the other natural, environmental factors which cause the country's devastating floods include the build up of eroded soil to river banks, which is a major factor in creating a negative funnel effect. Erosion leads to the rise of river beds, reducing the capacity of water that the rivers can contain, whilst increasing the amount of spillages created, this in turn creates a negative multiplier effect for residents. Human factors also make the effects of flooding worse for the country, such as sinking water wells-due to influxes in population, deforestation in Nepal which are used as fuel-to feed cater for Nepal's growing population-which increases the amount of run-off from waters coming to the country, and decreasing the amount absorbed by anchoring tree roots, from surface run-off from the Himalaya mountains (the largest range in the world) from precipitation stores. Diversion of the Ganges Rivers due to irrigation purposes creates a wider spread out of water. Long term affects also include the devastating effects of global warming, which can also be seen around the globe too. Floods are so severe in the country that have made World records; They include the Bangladesh Flood of 1998-the worst flood of the 20th century, lasting over 2 months, whilst the 1988 floods caused thousands of fatalities, not an unusual sight in Bangladesh. They effectively damage the county's economy, appearance, livelihoods, home s, and lives.

Along with floods droughts also occur in the country, so flooding can be a blessing in the country, which heavily depends on agriculture as part of maintaining its economy-it's one of Bangladesh's biggest industries (along side the textiles trade), by bringing much needed rich, alluvium silt, which provides useful nutrients to crops-such as staple foods of rice and wheat-which the country doesn't just export, but uses for themselves too. This is vital, as Bangladesh is amongst one of the

world's poorest countries. It is an L.E.D.C, where the GDP per Capita is about $440* (2006), while a MEDCs which would be more than $2000.

Due to the fact that Bangladesh is so poor, naturally, it has a lot of trouble recovering from the devastation that floods bring, and so they desperately depend on foreign/ international aid to help them to recover.

This is where the USA controversially got involved. They have first hand experience from the results of flood damage from the Mississippi River (it runs across the length of the country), and while they have now more or less brought under control the ir floods, they now want to sell on their state of the art technology, and have Bangladesh on their radar.

Below is a list of the strategie s that they are being offered, and what they involve. I have written the advantages of using each technique by their side, and further below I have evaluated the techniques efficiency. They are all 'hard' engineering options, which mean that they are major projects, which in turn have a larger impact on the river and surrounding landscape.

- **Wind Dykes**- *[illegible]*
- **Levees**- *[illegible]*
- **Dams and reservoirs**- *[illegible]*
- **Truncating**- *[illegible]*
- **Mattresses**- *[illegible]*

These methods do have there disadvantages too. 'Hard' engineering options are very expensive. Bangladesh is an LEDC, and don't have enough capital generation to be able to afford to use most/any of these techniques. Paying for these methods come with conditions attached/ 'stings in their tail', which include taking away healthcare/ emergency services privileges, and landing the country in debt with lots of interest which may never be able to be paid off. Also, they take a long time to build, which still allows some leeway for flooding to take place, and cause further destruction to a

fragile country. Furthermore, building a dam a reservoir, sediment is often trapped behind the wall of the dam, leading to downstream erosion. Settlements and valuable agricultural land may be in jeopardy of being lost when the river valley is flooded form the reservoir. This also uses up valuable land, which could be used to house the large population, or to farm to build up their economy. There is no big guarantee that these methods will stop flooding from occurring. This has been proven, in America these defences didn't work efficiently enough, and when flooding did occur it was much worse than it would have been if these methods hadn't been inputted, damage was large scale. But they recovered relatively well, as they are an MEDC, and have the capital to do so, Bangladesh do esn't. If a problem like this occurs in the country, then it may never be able to recover again, and may be washed away/ too badly damaged to recover. With truncating, the water will be diverted away from settlements, and harm agriculture, and irrigation , water will rush faster down the artificial course, and can cause heavy flooding downstream. It could cause problems for neighbouring countries too. In addition it is also an eyesore for the area in which it is to be built, especially wind dykes -which could harm the environment too .e.g. marine life, and mattresses can lead to the loss of shrubbery , levees can result in ecological damage too; it could change the physical appearance of the country, and deter people way from an area. Agricultural issues include water being diverted away from certain areas and cause detriment to the agriculture in the area, and to the economy as a whole-which largely depends on this. It is also arguable that there shouldn't be allowed to be human interception with the course o f nature, as this can have powerful repercussions on the area, but it is fatally destructive to allow ecological flooding to take place, as it causes concentrated damage to the country, and it is predicted that due to global warming getting worse low lying countries such as Bangladesh could disappear in 50 years, and so measures have to be taken, to prevent it from becoming lost for ever, and protecting a civilisation.

Local authorities and Governments draw up policies to control problems, such as creating restrictions about the amount of urban development that is to be allowed near flood plains. This reduces the chances of flood damage. Resistance to development restrictions in areas are stricter in LEDCs. Different interest groups hold different views about what should be done. Governments and developers generally favour big, hard engineering options. This is due to the fact there is a potential place to generate income and leisure revenues. Environmental groups and residents, however, generally prefer, and opt for soft engineering options, as they cause less damage to the environment and they don't involve resettlements.

In conclusion to the essay question, "Should Bangladesh buy .U.S. technology to protect itself from floods?" I have come to a deci sion that the facts shows us that Bangladesh should NOT buy .U.S. technology to protect itself from floods, because in general they are too expensive, and can not guarantee success.

First of all, I think that the country should look into 'soft' engineering options such as afforestation. This is where trees are planted near the river, so that there is greater interception of rainwater and lower river discharge. This

is a relatively low cost option, which enhances the environmental quality of the drainage basin. I think that this should especially be done close to the Himalayas, as this is where a lot of precipitation is released from stores. Shrubbery will intercept the water, and so less water will run -off and so there will be less flood water. If this method is not able to be put into action, then I think that it would be wise to undergo river engineering, and it is therefore wise to buy levees, as they are the most efficient, and have less disadvantages, they are also more affordable, as dredging rivers will not be able to make them deep enough, as Bangladesh is situated on low lying land. Ecological flooding (where the river is allowed to flood naturally, to prevent flooding i n other places e.g. settlements) is also not a good option because this has been proven to cause mass destruction.