Flood Management by Using AI Technology

Soma Mukherjee[1], Biswajit Mandal[2], Aparna Shaw[3] and Indrani Sarkar[4]

Associate Prof, Applied Science and Humanities, Guru Nanak Institute of Technology, Kolkata, India[1]

B.Tech Student, Information Technology, Guru Nanak Institute of Technology, Kolkata, India[2]

B.Tech Student, Computer Science and Engineering, Guru Nanak Institute of Technology, Kolkata, India[3]

Associate Prof, Basic Science and Humanities, Narula Institute of Technology, Kolkata, India[4]

Abstract: Natural disaster like flood is a very frequent and common phenomenon nowadays mainly due to the climate changes as a result of global warming. It's an issue of big concern since it damages human property, life and hampers our daily activity to a great extent. Fortunately, at present it's possible to control flood in a sustainable way. Major causes which can create flood are heavy rainfall, rapid snowmelt, storm from a tropical or tsunami in coastal areas etc. Mainly flood creates negative impact on human life as it damages human life, property and even endangers both human lives and other species. Sustainable management of flood considering all sources of floodwaters and taking proper actions to reduce its impact on communities is the biggest challenge at present. There are many techniques to control flood, most common of them are installation of rock berms along river and sea shores, application of soil cements on steeper slopes and construction of drainage channels. There are many agencies also which can help to control flood. Here in this paper it is tried to control flood by putting some AI based sensors in some multiple poles fixed at different places which will indicate the alarming situation that flood might occur and will open the valves in the built in channels by which the excess water will be bypassed. Moreover if this excess water can be stored, then it can be used in a sustainable way to irrigate a dry land, to supply to a place where there is scanty rainfall. This stored water can also be used to replenish the ground water level during summer. This approach can solve two major issues, one is of the flood and another, of the soil erosion and thus the soil would be conserved. The fertile upper crust along with the seedlings or seeds would persist. The AI technology of sensors will help the farmers with the unpronounced floods and it is not even necessary to worry for their crops further even if they are away or sick. This would save their debts, loss and also in a way will conserve soil along with water harvest.

Keywords: Natural disaster, Flood, AI technology, Sustainable management

I. INTRODUCTION

Climate change and the associated damage due to hydrological extremes like floods is a major issue in world right now. There are many helping agencies and organisations which are helpful after the flood. Floods are the most frequent type of natural disaster and occur when an overflow of water submerges land that is usually dry. There are several causes [1] of flood like heavy rainfall, rapid snowmelt, storm from a tropical or tsunami in coastal areas, collapsed dam, climate change, emission of greenhouse gases and many other factors. Sometimes the rivers bring heavy sediment load from catchments which when coupled with inadequate carrying capacity of rivers are responsible for causing flood, drainage congestion and river bank erosion. Cyclones, cyclonic circulations and cloud bursts cause flash flood which is frequent in the hilly regions and lead to huge losses. Large scale loss of lives and damage to public and private property [1] indicates that an effective response to floods needs to be developed. Sustainable management of flood considering all sources of floodwaters and taking proper actions to reduce its impact on communities is the biggest challenge at present. Three engineering strategies like channelization, construction of levees and construction of dams may be considered to control flood. Other common techniques used are installation of rock berms along the river or sea shores, maintaining normal slopes with vegetation, application of soil cements on steeper slopes and of course construction of drainage channels [1]. Since the system of monitoring is very few, several areas that flooded during rainy season happen to receive late aid.

II. REVIEW

Effects of flood: The impacts of flooding are abundant. Mainly it has negative impact on the human life as it damages property, endangers human lives and other species. It's worth to be mentioned here that it is possible to have some positive impact, if the flood water is controlled in a proper way. The wild life habitats, fish can become polluted or may be destroyed completely as the rapid running water generally causes soil erosion and subsequent deposition elsewhere. Sometimes flood water can delay traffic in those areas which lack elevated roadways. Structural damage can happen in the bridges, bank lines within the path of the flood water. Waterway navigation and hydroelectric power are often impaired. Floods can interfere with drainage and economic use of lands like farming and how it can be managed is our main topic to be discussed in this paper. Financial losses due to it are generally millions and millions of dollars each year.

Management of flood: Management of flood is a big issue at present as it is often in conflict with water supply practices and needs. In many countries, rivers prone to floods are often carefully managed [2]. Various types of defences like levees, reservoirs, weirs are used to prevent rivers from bursting their banks. In many cases these defences may fail and emergency measures such as sandbags or portable inflatable tubes can be used. Coastal flooding is addressed here in the Sundarban area, along the Jalangi river in Murshidabad to mention a few with sea walls, beach nourishment etc. Dike is another alternative method of flood protection which lowers the risk of having floods. Though it can help to prevent damage but it is better to combine with other flood control methods to reduce the risk of a collapsed disk. Another alternative and good approach is to construct enough available reservoir storage space to store the flood waters so that it can be used to fetch dry lands or to protect humanity against drought. A weir, a low head dam is often used to create millponds to prevent a recurrence of the flooding [3]. This overall management requires different local, state and federal agencies and their management philosophies change with the political and economic times. The state may also coordinate with different local, state and federal agencies along with their management philosophies which might change with the political and economic times. Proper infrastructure should be there to reduce flooding like upstream dams can be constructed but the main concern is about the adequacy of downstream levees in providing protection.

Fig.1 Portions of Irrigation field submerged under flood water

This natural disaster is inevitable but the destruction can be minimized with advance warning system and early response [3] although many of the other techniques are already discussed here. Alerting or warning to notify the public about the upcoming disaster in the early stages is very important as safety measures can be taken to prevent unwanted mishaps. There may be lack of concern of the early warning system and there basically lies the need of technology. With the advance of technologies, simple and low cost tools can be used to solve such problems.

III   PRESENT METHODOLOGY

When floods occur in cultivation field it causes a huge damage to the farmers. The speed of the flow of the water is pretty fast and the farmers can't find an alternative way to manage the overloaded field. It causes them a huge loss of money and this leads to debt, hence here in this paper this problem is focussed and tried to be solved by using the AI technology. The organisation and the agencies which are helping after the flood has hit or have shown its effect and are pretty helpful but there is a need for an alternative to overcome the problem and a precaution to ultimately stop the damage rather than just curing the damage [4,5]. The present idea of implementing the use of AI technology in this field comes with a very simple yet innovative approach.
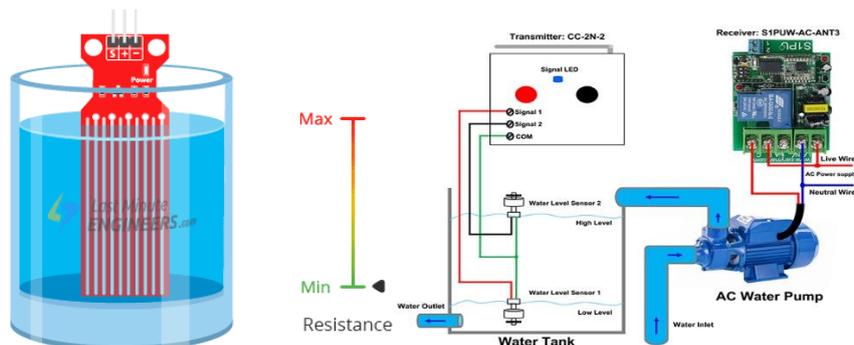

Fig. 2 Schematic diagram of the proposed model using AI sensors

Approach: The approach starts with the implementation of AI sensors which would sense the level of water. This would not only protect from flood but also in some other cases like rivers over flooding due to any particular reason. This approach would need the construction of few poles where the AI sensors may be installed. The good idea is to implement multiple sensors so that in case of technical fault or any other issues if few of them stops to sense than others can give the support to sense the water to ensure the safety.

Figure 2 shows the schematic diagram of the proposed model. In this figure it is shown that if the level crosses the mark it sends the signal to the device in which it is connected. When the sensors have sensed the raising water signals, then the connected pipelines will open their gates to pull the water out of the fields with the help of the suction pumps which can be implemented. The water would go into an underground well like area which can further be used at the time of no water or scanty rainfall. Also this water can replenish the ground water level as well through the wells where the water is getting stored. This approach is going to solve two of the major issues, one is of the flood and another, of the soil erosion and thus the soil would be conserved. The fertile upper crust along with the seedlings or seeds would persist. The AI technology of sensors will help the farmers with the unpronounced floods and it is not even necessary to worry for their crops further even if they are away or sick. This would save their debts, loss and also in a way can conserve soil with water harvest.

IV. CONCLUSION

Here in the preset paper it is concluded that the flooded water can be monitored and subsequently controlled through a simple technology and can be sustainably managed for various useful purposes. It also solves two major problems of humankind one is ground water depletion and other is soil erosion. Finally this technology is so simple that, if implemented will be helpful to mankind and save our mother earth.

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