

Role of Education in Flood Mitigation in India

Dr. Mubeen Beg

Department of Civil Engineering,
Z.H. College of Engineering and Technology,
AMU, Aligarh, U.P., India
E-mail: raisbeg2013@gmail.com

ABSTRACT

This paper deals flood mitigation measures through education for the sustainable development of India. The threat of an outbreak of an epidemic looms large over the dirty flood ravaged lanes and by-lanes of cities. Tones of mud, muck and slush are piled up while carcasses of dead animals begin to rot and the stench in the towns reaches nauseating levels. The unprecedented duration and intensity of flood contaminate local water resources of drinking water. Poor quality of drinking water becomes a major cause of morbidity and mortality. Choked drains cause the sewage water to spill on to the streets and chronic water and air born diseases like chronic dysentery, diarrhea, gastroenteritis, jaundice and Japanese encephalitis and viral fever outbreak. Many people succumb to these diseases. In this scenario it becomes indispensable to provide flood defense education from school level. The people through this education system can learn how to respond the arriving floods and environmental challenges aftermath of flood.

Keywords: Floods, Environmental Education, Students, Schools, Sustainable Development,

1. INTRODUCTION

Flood occurs in many ways. The most common flood occurs when rivers or streams overflow their banks (riverine floods).. Heavy rain, a broken dam or levee, rapid ice melt in the mountains, can overwhelm a river and send it spreading over nearby land (flash flood). Coastal flooding (estuarine flooding) happens when large storm or tsunami causes the sea to rush inland. The land surrounding a river is called a flood plain. Floods are the second-most widespread natural disaster on Earth, after wildfires.

1.1 Natural Causes of Floods

In general floods occur naturally. They are part of the water cycle. Conditions that cause floods include heavy or steady rain for several hours or days that saturate the ground. Flash floods occur suddenly due to rapidly rising water along a stream or low-lying area.

Sometimes, floods are triggered by other natural disasters, such as earthquakes and tsunamis. Rain that accompanies hurricanes and cyclones can quickly flood coastal areas. The rise in sea level that occurs during these storms is called a storm surge. A storm surge is a type of coastal flood. They can be devastating. The

strong winds associated with hurricanes and cyclones can also whip up and move huge amounts of water, forcing a storm surge far inland.

Deforestation, Soil Erosion, Global Warming, Population Growth, Urbanization, Poor Drainage Conditions, Dumping of Garbage in National Water Carriers, Tropical Storms and Hurricanes, Spring Thaw, Heavy Rains, Levees & Dams, Flash Floods, New Development and Flood Plain Encroachment are the prominent factors causing floods.

Tropical Storms and Hurricanes, Spring Thaw, Heavy Rains, Levees & Dams, Flash Flood, New Development and flood plain encroachment are other factors causing flood.

Deforestation in the upper region exposes the land to soil erosion. The top fertile layer of land is washed away and deposited in the rivers. The land turns into gullies and the rivers becomes shallow. Then the rivers are easily prone to floods afforestation is the solution of deforestation. The drainage facilities may be clogged due to dumping of garbage.

1.2 Man Made Causes Of Floods

Floods can also have man-made sources. Many man-made floods are intentional and controlled. Dams control the natural flood plains of lakes and rivers. Hydrologists may intentionally flood areas to prevent damage to the dam or increase the water supply for agriculture, industry, or consumer use.

2. EFFECTS OF FLOODS

Floods have enormous destructive effects. When a river overflows its banks or the sea moves inland, many structures are unable to withstand the force of the water. Bridges, houses, trees, and cars are picked up and carried off. Floods erode soil, taking it from under a building foundation, causing the building to crack and tumble. Floods can cause even more damage when their waters recede. The water and landscape can be contaminated with hazardous materials, such as sharp debris, pesticides, fuel, and untreated sewage. As flood water spreads, it carries disease. Flood victims can be left for weeks without clean water for drinking or hygiene. This often lead to outbreaks of deadly diseases like typhoid, malaria, hepatitis A, and cholera. banks.

Floods can also devastate an environment.

Due to floods and anthropogenic activities, environmental degradation is increasing at an alarming rate as a result of which various environmental issues such as, global warming, floods, drought, ozone layer depletion, greenhouse effects, rise in sea water level; improper monsoon and acid rain are emerging out. In order to achieve the acceptable level of global environmental sustainability, the society must be empowered with essential knowledge and information of floods and its effects on environment especially in developing countries like India.

Since educational institutions are the places where the contact of the society is more, it is possible to bring remarkable changes in the mindset of the public in this regard. Environmental education represents a relevant means of floods mitigation and control on environmental degradation because this type of education encourages people's awareness of their environment's ambient conditions, as well as their active participation in solving local problems.

It is the need of the hour to propose environmental education to cope with the challenges posed by adverse impact on environment due to floods. To accomplish this task, syllabus, should be proposed for environmental education and flood mitigation in schools and also undergraduate students at college level. Through such education one can make the general public to realize gravity of the water quality degradation and sustainable development of the country easily. Once the people understand, they can seek themselves the solution if they are civilized.

2.1 Environmental Education

Environmental education has two essential components:

1. Alerting the public to the need to achieve global sustainable development and the likely consequences of failing to do so.
2. Focusing the educational curricula for global sustainable development by incorporating the know-how and skills and also the moral imperatives.

Clean and disinfect everything that got wet. Floodwaters pick up sewage and chemicals from roads, farms, factories and storage buildings. Spoiled food, flooded cosmetics and medicines are health hazards. When in doubt, throw them out. Service damaged septic tanks, cesspools, pits, and leaching systems as soon as possible. Damaged sewage systems are serious health hazards. In case of a significant flooding threat, we should think about installing sewage backflow valves. These valves stop sewage from re-entering our home due to sewage system backups that are caused by floods. If these types of valves are not in place, sewage can backup through toilets and drains, causing quite a mess and introducing harmful bacteria into your home.

3. TEACHING METHODOLOGY IN SCHOOLS

The young minds may be moulded very easily and they will be having their own ideas and concepts about pollution. The environmental education should be included in curriculum of studies from school level. One of the goals of science education or environmental education at the elementary level is the evolution of children's initial conceptions into conceptions that are more thought-out and/or closer to those of the scientific community. This evolution is called conceptual change [Duit, R 1999].

For children in industrialized countries, environmentally related diseases like asthma, lead poisoning, cancer and certain neurological or behavioral problems have progressively replaced infectious diseases [Landrigan et.al.,2002]. Children ingest greater quantities of toxins because they breathe twice as much air, consume three to four times as much food, and drink two to seven times as much water relative to their body weight, than adults [Landrigan et. al, 2002.]. Children are thus particularly vulnerable to pollutants present in the air that they breathe, water that they drink, food that they eat and environments in which they grow, learn and play.

Several pedagogical strategies that favour conceptual change have been identified (Hewson et.al., 1989, 1998, Garrison et al., 1990 , Di Sessa et.al. 1998,). The idea is to first invite students to express their ideas regarding a given phenomenon and then present them with a demonstration that counters those ideas. A teacher must, during the educational process, encourage the expression of a variety of ideas from different people in the class and must invite them to fully explain their ideas.

4. TEACHING METHODOLOGY IN COLLEGES

4.1 Curriculum Development

The younger generations, students are the effective media to bring enormous changes in the society and hence educating about the environment to the young minds is the right step and also this is the right time for the same. Science and Technology, even though advanced, cannot help in bringing about the change of attitude. Hence education in moral and ethical philosophy is needed and Environmental study should be made a mandatory part.

4.2 Communication approach in responsible environmental behaviour:

Education has been identified as a critical driving force for change in various parts of the world in environmental education (Fien, J. 1999). Environmental education causes awareness and enables wholehearted participation by people. People recognize the immensity of the challenges they face, and of the

vital role that they can play in meeting these challenges. In India, environmental topics have been included in education courses to meet the growing environmental challenges by promoting environmental education, information and communication.

4.3 Information Dissemination

Dissemination of environmental information in general and specifically during and aftermath of floods is extremely important in environmental management, since it plays a vital role in sensitising individuals to environmental issues. In the past, dissemination has been done through mass media and scientific publications, however, advanced technology, especially the electric media, is now playing an increasing role.

4.4 Formal Education & Training Institutions

A number of public and private training institutions offer formal education programmes at the infant, primary, secondary and tertiary levels for Environmental Education and Sustainable Development. Curriculum development, standard setting and certification are done at the national level.

4.5 The Media

By widespread radio audience, television, cable, satellite dish and Internet the environmental education for sustainable development is achieved. In the print sector, morning daily newspapers, an afternoon paper, several weekly publications, and other community and special interest newspapers and magazines are useful for this purpose. The government also operates a separate ministry of flood control.

Advertising is also an important medium for social messages, as are entertainment media – including music, art, dance and drama – which have considerable potential to convey Environmental Education for Sustainable Development messages.

5. SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL SUSTAINABILITY

Sustainable Development is a concept, relating to the coordination of social, environmental and economic considerations for long-term human development.

The common definition for sustainable development is as follows:

“Development that meets the needs of the present without compromising the ability of future generation to meet their own needs”

It is clear that sustainable development is economic development that exclusively relies upon and is firmly rooted in the integrity and sustainability of the natural environment. If nature's resource base is irredeemably depleted or irreversibly degraded, the means of wealth creation for social welfare will be seriously jeopardized. Without environmental sustainability, it is impossible to achieve sustainable development.

The pursuit of sustainable development and environmental conservation policies and objectives requires the public to be sufficiently sensitized about the environment and development. Awareness and understanding of environmental issues before, during and aftermath of floods provide the basis and rationale for commitment and meaningful action towards environmentally sound sustainable development.

5.1 Sustainable Development Planning

Sustainable Development Planning is an approach which takes account of people's needs, rights and economic opportunities, within communities, while simultaneously promoting the sustained protection of the natural environment.

Water pollution in general and specifically due to flooding is an increasing problem. Due to the contamination of water supply sources and connected downstream wetland, estuary and marine ecosystems, by sediments, pathogens and chemicals – most of them resulting from floods, deforestation of watersheds, improper disposal of wastes, and run-off contaminated by agro-chemicals.

In such circumstances Environmental Education for Sustainable Development can improve commercial/industrial sector awareness of the risks to human health and safety, to economic sustainability and to the natural environmental posed by unsustainable commercial and industrial activity; leading to changed attitudes and relevant action.

5.2 Water and Land Use Management

Population growth, coupled with industrial and commercial expansion has resulted in intense land requirement, which is often not allocated to its optimum use. Environmental Education for Sustainable Development can promote knowledge of land ecology, and awareness of the importance of sustainable land use planning and practices, among planners, local government officials, developers, resource users and citizens. Many urban and rural households lack satisfactory sanitation. In addition, the collection and disposal of solid waste presents environmental, public health, social and liability problems.

5.3 Clean Technologies

There is increasing attention to practices and technologies which reduce the generation of pollutants, thereby reducing clean-up costs, lessening adverse environmental impact and natural resource depletion and protecting human health. This is achieved through improved technology. Environmental Education for Sustainable Development can promote government and private sector responsibility to adopt environment-friendly technologies.

5.4 Role of Awareness of Society in Sustainable Development

The people in a society are unaware about the dire consequences of pollution of environment and water resources. In many localities, the public has connected their water closet pipes directly to the upper strata of earth. They do not realize that what they are feeding, they themselves will consume it, particularly poor people who rely on the upper strata for withdrawing water by hand pumps.

5.5 Adverse Impact of Contaminated Water Resources on Sustainable Development

Safe water in sufficient quantities is fundamental to human health. The most important water-associated health problem is diarrhea, accounting thousands of deaths per year, especially among children. Availability of safe drinking water, combined with sanitary facilities and improved hygiene standards, could prevent diarrheal disease to a great extent in developing countries.

In the light of aforementioned discussion it can be concluded that contaminated water resources cause many life taking diseases which ultimately affect adversely the sustainable development of a region. The government and NGOs are engaged in such environmental problem and the money which could be spent on developmental works, goes waste to solve polluted water problems. Sometimes the situation takes political colour which also has adverse impact on the development.

5.6 Effect of Urbanization

Humanity has crossed the line from being a rural to urban species. Urbanization has especially increased in India to a substantial extent. Urbanization will eventually lead to negative consequences for the environment

as well as for the water resources. The environmental and social problems associated with water scarcity point to a crisis in urban water resources management, and one that threatens the security and livelihood of the population and the environment over the coming decades. With rising population the adequate water supply risks to become an insolvable problem due to the serious decrease of ground and surface water quality together with a drastically decreasing infiltration rate by reason of rising structural densification.

5.7 Water Education

Water availability is taken for granted by public in our country. Domestic liquid waste disposal into surface and ground water sources is causing serious concern to the human health and environment. By force solution of the problem often leads to political crises, therefore, the lasting solution to this water crisis, is better possible through water education. The school education should include the subjects which make the public to realize the importance of available water resources and preservation of them in good health. The people should be educated and trained about optimal use of water to fulfill their needs. Once the people are educated how to keep the available fresh water resources clean, they can make the general public to feel the gravity of the water quality degradation easily. Through such education, sense of better civilization can be generated which can make the task of healthy water resources preservation easy.

5.8 Efficient Drainage System

Developing countries lack in effective drainage system. Domestic and industrial waste water stands in lanes and bye lanes due to poor drainage system. The pollutants leached through soil into the shallow ground water aquifers which are the only water resources for the poor people who have an access to fulfill their requirements and due to which these poor people fell pray to various life taking diseases. Furthermore, poor drainage system causes bad stench which often reaches to nauseating levels causing air pollution and viral infections diseases. Using modern technology, the drainage system should be such that the waste water is disposed off away from inhabited area as quickly as possible. The people should be educated and motivated not to dump their garbage into the drainage system.

5.9 Public Motivation and Awareness System

Water quality is deteriorating due to pollution from almost all human activities. Therefore, as water pollution is due to human activities, the better solution to the problem of pollution of fresh water resources lies in the hands of the public. Through media, public contact programmes, seminars and symposia, people should be motivated to keep fresh water resources in healthy condition. Concerted efforts should be made to make the people to realize the severity of this problem through sustained awareness programs. Once the people understand, the implementation of legislation devised to preserve the fresh water resources, becomes easier. People can seek themselves the solution if they are civilised.

6. Legislation and Polluter Pay Principle

Freshwater carriers are national properties and nobody should be allowed to interfere by polluting them. They must pay discharge rights to use national fresh water bodies as carriers of their waste. Pollution prevention can, therefore, be achieved by applying the polluter pay principle. Through education and public and public motivation, strict legislation should be enacted and sincerely implemented to prevent the polluters from discharging their effluent waste water in freshwater resources without treatment

Flood plain regulation must be prepared at the centre and states must be forced to follow them. In urban areas regulation should be used to eliminate unsafe occupancy of flood prone area. People should be prevented from encroaching the drains. At some places in our country people have constructed their

buildings over the drains and municipalities have to strive hard to clear them. To stop this very stringent law should be enacted through confidence building measures.

6.1 Social Impacts of Flooding

Flood protection activities are essentially aimed at ensuring a sense of security for the population living in flood prone area. The people lose their jobs, business, become homeless, subject to threat from unsocial elements. In short, flood takes away what the people have or earned. The security of people against vandalism, rowdyism, robbery, thefts, cheatings, corruption and other insults during flood, should be ensured through education.

6.2 People's Coordination in Flood Preparedness

People should be educated to prepare themselves in response to flood warnings by organizing and facilitating effective fighting to prevent flood damage

6.3 Goals of Environmental Education for Sustainable Development

Based on the vision of Environmental Education for Sustainable Development and its role in developing a sustainable society, five broad goals are identified: To disseminate the knowledge, know-how and skills needed to improve the understanding and management of natural resources including flood water, agriculture, energy and industrial production, and of the built environment, thereby contributing to sustainable production and consumption patterns;

To change values, ethics, attitudes, behaviours and lifestyles so as to facilitate improved management of natural resources including floods, agriculture, energy and industrial production, and of the built environment; thereby helping to bring about sustainable production and consumption patterns;

6.4 Role of science and technology in delivering environmental sustainability:

There is a contribution of science and technology in environmental protection by alerting us to potential or manifest environmental problems. For example, it is through science that the global impacts of some of our polluting activities have been discovered mainly in terms of qualitative cause-effect relationships. Once a scientifically sound cause-effect relationship is established, appropriate measures may be taken up by the community to modify their lifestyle in a way that reduces or stops further environmental degradation.

7. CONCLUSIONS

Due to anthropogenic activities, environmental degradation is in an alarming rate and it resulting in various environmental issues such as global warming, ozone layer depletion, greenhouse effects, raise in sea water level, improper monsoon and acid rain.

Syllabus should be proposed for environmental education and flood mitigation in schools and also undergraduate students at college level. Through such education the general public can realize gravity of the water quality degradation and sustainable development of the country easily.

The adverse human health consequences of flooding are complex, far-reaching and difficult to attribute to the flood event itself.

The international community is serious about achieving even a modest degree of global environmental sustainability and sustainable development.

Providing accurate information on safe management of flood water during evacuation and clean-up and on the actual situation is essential. Aforestation should be implemented to control soil erosion. People should be motivated and educated not to discharge their effluent waste water into the freshwater resources.

Without full participation and coordination of society at all levels, it is not possible to envisage or implement sustainable solutions addressed to environmental problems with specific reference to floods.

6. REFERENCES

- Anna Kurtycz (2005). Understanding Environmental behavioral change through communication: a new perspective of environmental education, *International Journal of environment and Pollution*, Vol.4 , No.1,pp 35 - 46.
- Bhaskar Nath (2005). Proposal of environmental education of engineering graduates, *International Journal of environment and Pollution* , Vol.23, No.1, pp 1 – 15.
- Di Sessa, A.A. and Sherin, B.L. (1998). What changes in conceptual change?, *International Journal of Science Education* , Vol. 20, No. 10, pp.1155–1191.
- Duit, R. (1999). Conceptual change approaches in science education, in Schnotz, W., Vosniadou, S. and Carretero, M. (Eds.): *New Perspectives on Conceptual Change* , Pergamon, Amsterdam , pp.263–282.
- Fien,J. (1999). With Education and learning for Sustainable Consumption, *Environmental Education in Europe*, (in:Trans.) Korlanc, Info Group, Budapest.
- Garrison, J.W. and Bentley, M.L. (1990). Science education, conceptual change and breaking with everyday, experience, *Studies in Philosophy and Education* , Vol. 10, pp.19–35.
- Hewson, P.W. and Thorley, N.R. (1989). The conditions of conceptual change in the classroom, *International Journal of Science Education* , Vol. 11, pp.541–553.
- Hewson, P.W., Beeth , M.E. and Thorley, N.R. (1998). Teaching for conceptual change, in Fraser, B.J. and Tobin, K.G. (Eds.): *International Handbook of Science Education* , Kluwer Academic Publishers, Great Britain , pp.112–126.
- Hewson, P.W., Beeth , M.E. and Thorley, N.R. (1998). Teaching for conceptual change, in Fraser, B.J. and Tobin, K.G. (Eds.): *International Handbook of Science Education* , Kluwer Academic Publishers, Great Britain , pp.112–126.
- Landrigan, P.J., Schechter, C.B., Lipton, J.M., Fahs, M.C. and Schwartz, J. (2002). Environmental Pollutants and Disease in American Children: Estimates of Morbidity, Mortality and Costs for Lead Poisoning, Asthma, Cancer and Developmental disabilities, Center for Children's Health and the Environment, Website: www.childenvironment.org.
- Lucas Arthur, *Environmental Education: From Policy to Practice*, British Council Seminar, King's College, London, U.K. (1995).
- Nersessian , N.J. (1991). Conceptual change in science and in science education, in Matthews, M.R. (Ed.): *History, Philosophy and Science Teaching* , Teachers College Press, Toronto , Canada , pp.119–127.