© 2018 IJSRSET | Volume 4 | Issue 7 | Print ISSN: 2395-1990 | Online ISSN : 2394-4099
Themed Section : Engineering and Technology

The Environmental Risk and Water Pollution : A Review From The River Basins of Some Countries

Hemant Kumar Singh
M.A (Net) Department of Geography
University of Allahabad

ABSTRACT

"Water for Life" has declared as the International Decade (2005 to 2015) for Action for water by the United Nations General Assembly in 2005. Because of the rapid increase in demand for water, and increase in occurrences of pollution of numerous water sources, environmental risks to humans and other life beings are enhanced. Due to changes in the quantity and quality of water, some environmental disasters are causing stress and hardships in a river basin in around the world. This paper reviews empirical evidence on the impact of polluted river water in the context of environmental risk as well as Ecological Risk. A rigorous survey has done on the existing literature of environmental risk and water pollution in respect of ecological, social and economic boundaries in the river basin area. The review findings concluded that polluted river water are seriously caused for hampering of the Sustainable Development (SD) especially in the context of sustainable development, ecosystems change, sustainable livelihoods, land cover, ecosystems, environmental sensitivity, biodiversity and geo-diversity as well as social and economic arena in a river basin over the world.The study also provides evidence that local communities are suffering from a variety of health problems including skin, diarrhea, dysentery, respiratory illnesses, anemia and complications in childbirth. Yellow fever, cholera, dengue, malaria and other epidemic diseases are also available in this area.

INTRODUCTION

Water is the most vital element among the natural resources, and is critical for the survival of all living organisms including human, food production, and economic development. Today there are many cities worldwide facing an acute shortage of water and nearly 40 percent of the world's food supply is grown under irrigation and a wide variety of industrial processes depends on water. The environment, economic growth, and developments are all highly influenced by water-its regional and seasonal availability, and the quality of surface and groundwater. The quality of water is affected by human activities and is declining due to the rise of urbanization, population growth, industrial production, climate change and other factors. The resulting water pollution is a serious threat to the well-being of both the Earth and its populationExcessive human pressures on the earth are causing a range of global environmental changes which impact on the safe and secured water for the lives in the

world. Due to changes in the quantity and quality of water, some environmental disasters are causing stresses and hardships in a river basin in around the worldPollution of river bodies has become a major problem that is becoming critical because of inadequacy or non-existence of surface water quality protection measures and sanitation. Lagoons, rivers and streamsare sinks for wastes. Wastes are most often discharged into the receiving water bodies with little or no regard to their assimilative capacities. The discharge of raw sewage, garbage, as well as oil spills are threats to the diluting capabilities of the lagoons and rivers in the major cities. The natural purification of polluted waters in itself is never fast, while heavily polluted water may traverse long distance in days before a significant degree of purification is achieved

LITERATURE REVIEW

In such issues, water pollution is an important and essential issue in the world which requires ongoing evaluation and revision. The statistical data counted that more than 14,000 people died daily and 700 million Indians have no access to a proper toilet, and 1,000 Indian children die of diarrhea sickness every day (Reporter, 2008; White, 1992)On the other hand, of 90% of china's cities suffer from some degree of water pollution and nearly 500 million people lack access to safe drinking water(Baoxing, 2005). In addition to the acute problems of water pollution in developing countries, developed countries continue to struggle with pollution problems as well. In the most recent national report on water quality in the United States, 45 percent of assessed stream miles, 47 percent of assessed lake acres, and 32 percent of assessed bays and estuarine square miles were classified as polluted. Generally, water pollution is covered in water bodies of toxic chemicals and biological agents which exceed what is naturally found in water and may pose a threat to human health and the environment. The polluted water caused serious problems for human health as well as hampered ecological and environmental agents (Zaidi, 1994; Z. Zhang et al., 2010). Moreover, the range of health risks from climate change include direct, indirect (mediated), and diffuse and delayed effects. The health risks posed by climate change are now beginning to challenge the skills, creativity, and policy engagement of researchers, policy analysts, and stakeholders (Tong & McMichael, 2011). On the same way, studies identified that the huge number of chemicals released into the river which caused for environmental risk around the river basin area. It has concluded that 49% of the overall basin presently has soil loss greater than the tolerable rate, thus indicating that there are zones where the erosion process is critical, meaning that both management and land-use have not been used appropriately in these areas of the basin (Beskow et al., 2009). In such issues, this study has an aim to do rigorous reviews of empirical evidence on the impact of polluted river water in the context of environmental risk as well as Ecological Risk. This rigorous survey has done on the existing literature on environmental risk and water pollution in respect of ecological, social and economic boundaries in the river basin area over the world.

BACKGROUND OF THE STUDY

WATER POLLUTION & ENVIRONMENTAL RISK IN THE WORLD

Water is the alternative name of life and without water life is impossible to continue. Due to increase of the number of population in the earth every day have caused of rapidly increased in demand for water, and increase in occurrences of pollution of numerous water sources, environmental risks to humans and other life beings are enhanced. Due to changes in the quantity and quality of water, some environmental disasters are causing stress and hardships in a river basin in around the world (Anh, et al., 2010; Arkoosh, et al., 2010; Cataldo, et al., 2001). In such issues, water pollution is an important and essential issue in the world which requires ongoing evaluation and revision. The statistical data counted that more than 14,000 people died daily and 700 million Indians have no access to a proper toilet, and 1,000 Indian children die of diarrhea sickness every day (Reporter, 2008; White, 1992).
On the other hand, of 90% of china's cities suffer from some degree of water pollution and nearly 500 million people lack access to safe drinking water(Baoxing, 2005). In addition to the acute problems of water pollution in developing countries, developed countries continue to struggle with pollution problems as well. In the most recent national report on water quality in the united states, 45 percent of assessed stream miles, 47 percent of assessed lake acres, and 32 percent of assessed bays and estuarine square miles were classified as polluted. Generally, water pollution is covered in water bodies of toxic chemicals and biological agents which exceed what is naturally found in water and may pose a threat to human health and the environment. The polluted water caused serious problems for human health as well as hampered ecological and environmental agents (Zaidi, 1994; Z. Zhang, et al., 2010). Moreover, the range of health risks from climate change include direct, indirect (mediated), and diffuse and delayed effects. The health risks posed by climate change are now beginning to challenge the skills, creativity, and policy engagement of researchers, policy analysts, and stakeholders (Tong & McMichael, 2011)

METHODOLOGY OF THE STUDY

This study conducted based on the survey of common empirical studies on the causes of environmental risk through polluted water over the river basin area around the world. In this study, we conducted the general search by the name of “Environmental Risk and River water pollution and causes of environmental risk and impact of polluted water. From this search we found huge numbers of the article abstract, which we have read to determine which articles need to be included in the review of this paper. After reading through most of the articles were found are as case study approach and qualitative analysis of research. But we focus in this papers those are directly empirical and related with the key words of environmental risk and river water pollution and causes of environmental risk and impact of polluted water

FINDINGS OF THE STUDY

There is large number numerous studies have done to examine how environments are changing due to changes in the quantity and quality of water and why environmental disasters are causing stress and hardships in a river basin in around the world (Anh, Kroeze, Bush, &Mol, 2010; Arkoosh et al., 2010; Cataldo, Colombo, Boltovskoy, Bilos, &Landoni, 2001). Moreover, the statistical data counted that more than 14,000 people died daily and 700 million Indians have no access to a proper toilet, and 1,000 Indian children die of diarrhea sickness every day (Reporter, 2008; White, 1992). The study has recorded rigorous survey of the existing literature on environmental risk and water pollution in respect of ecological, social and economic boundaries in the river basin area over the world. Moreever Wang, C., Y. Feng, et al. in 2012 has done a one-dimensional dynamic contaminant fate model, coupling kinematic wave flow option with advection–dispersion-reaction equation in Songhua River, China. The model includes kinetic processes including volatilization, photolysis and biodegradation, and diffusive mass exchange between water column and sediment layer as a function of particles settling and resuspension. The results generally show that the modeled and detected concentrations exhibit good consistency. Flow velocity in the river is most sensitive parameter to Nitrobenzene concentration in water column based on sensitivity analysis of input parameters. It indicates flow velocity has an important impact on both distribution and variation of contaminant concentration. The model performs satisfactory for prediction of organic pollutant fate in Songhua River, with the ability to supply necessary information for pollution event control and early warning, which could be applied to similar long natural rivers (C. Wang, Feng, Zhao, & Li, 2012). Dawadi, S. and S. Ahmad in 2012 focuses on the effects of climate variability and climate change on the Colorado River flow as well as on implications for water resources management. A system dynamics model was developed for the Colorado River Basin, operating on a monthly time scale from 1970 to 2035. Changes in stream flow were simulated with a hydrologic model that used outputs from 16 global climate models (GCMs) and 3 emission scenarios. Ensemble averages of the GCMs for each emission scenario indicated an increase in temperature over the period of 2012–2035. The magnitude and direction of change in precipitation varied among ensembles of GCMs for different emission scenarios, with A1b showing a decrease and A2 and B1 showing an increase. Ensemble average shows a small increase in precipitation by about 0.4%. An ensemble average reduction in stream flow by about 3% was observed until 2035. This reduction resulted in significant effects on the water supply to the Basin states, with varying reliability values for water supply (Dawadi& Ahmad, 2012). Zhang, R., G. Zhang, et al. in 2012 investigated in the rivers discharging to the Laizhou Bay and the seawater of the bay, and the impacts of river discharge on the marine environment were assessed. The results revealed that the same antibiotics predominated in both the river water and the sea water. Additionally, the detected antibiotics in the river water were generally higher than those in the inner bay and in the open bay, reflecting the importance of the riverine inputs as a source of antibiotics. Risk assessment based on the calculated risk quotients (RQ) showed that enoxacin, ciprofloxacin, and sulfamethoxazole in the two aquatic environments both posed high ecological risks (RQ>1) to the most sensitive aquatic organisms Vibrio fischeri, Microcystisaeruginosa and Synechococcusleopoliensis, respectively (R. Zhang et al., 2012). Whitworth, K. L., D. S. Baldwin, et al. in 2012 examined the biogeochemistry and hydrology

underpinning this extreme event and found that multiple drivers contributed to the development and persistence of hypoxic blackwater. Inundation of both forested and agricultural floodplains that had not been flooded for over a decade mobilised large stores of reactive carbon. Altered flow seasonality, due to a combination of climatic effects and river regulation, not only increased the risk of hypoxic black water generation but also shifted the proportion of bioavailable carbon that was returned to the river channels. Hypolimnetic weir discharge also contributed to hypoxia at some sites. These findings highlight the need for a whole-of-system perspective for the management of regulated river systems– especially in the face of a changing climate (Whitworth, Baldwin, & Kerr, 2012). Da Costa, T. C., K. C. T. de Brito, et al. in 2012 looked at the genotoxic potential of samples from a contaminated site on the banks of the Taquari River, RS, Brazil, where potential environmental problems hadbeen identified (pentachlorophenol, creosote and hydrosalt CCA). Positive mutagenicity results in the Salmonella/microsome assay of the material exported from the area indicate that contaminant mixtures may have drained into the Taquari River. This was confirmed by the similarity of mutagenic responses (frameshift indirect mutagens) of organic extracts from soil and river sediment exported from the main area under the influence of the contaminated site. The Allium cepa test showed significant results of cytotoxicity, mutagenic index and chromosome aberration in the area under the same influence. However, it also showed the same similarity in positive results at an upstream site, which probably meant different contaminants. Chemical compounds such as PAHs, PCF and chromium, copper and arsenic were present in the runoff of pollutants characteristically found in the Taquari River sediment (da Costa et al., 2012). Davutluoglu, O. I., G. Seckin, et al. in 2011 was studied of chemical fractionation of seven heavy metals (Cd, Cr, Cu, Mn, Ni, Pb and Zn) by using a modified three-step sequential procedure to assess their impacts in the sediments of the Seyhan River, Turkey. Samples were collected from six representative stations in two campaigns in October 2009 and June 2010, which correspond to the wet and dry seasons, respectively. The total metal concentrations in the sediments demonstrated different distribution patterns at the various stations. Cadmium was the only metal that was below detection at all stations during both sampling periods. Based on RAC classification, Cd and Cr pose no risk, Cu and Ni pose low risk, Pb and Zn were classified as medium risk metals, while the environmental risk from Mn was high. In addition, based on the sediment quality guidelines (SQG), the Seyhan River can be classified as a river with no, to moderate, toxicological risks, based on total metal concentrations (Davutluoglu, Seckin, Ersu, Yilmaz, & Sari, 2011). Chen, Y., Z. Ye, et al. in 2011 analyses the desiccation tendency and hydrological regime of the Tarim River, discusses the causes of this condition, the point of zero flow movement, and the influence on the ecological security in the Tarim River basin that may be caused by the further development of desiccation. The main causes of the river desiccation were the increase in irrigated area of the head stream section in the upstream region, the rise in water consumption in the upper and middle reaches, and the construction of reservoirs in the mountain areas. Accordingly, possible countermeasures and ideas for mitigating the desiccation tendency are suggested, so as to provide decision-making references for water resource management and sustainable and healthy social, ecological and economic development in the Tarim River basin (Yaning Chen, Ye, &Shen, 2011). Anticona, C., I. A. Bergdahl, et al. in 2011 Since 2006, three studies have reported elevated levels of lead (Pb) among the indigenous population of the Corrientes river, in the Amazon basin of Peru. Due to the large evidence of environmental pollution related to oil exploitation in the area, this activity

has been suggested as the source of exposure. This study aimed to evaluate Pb levels in the population and environment of two communities exposed and one community non-exposed to the oil exploitation activity. Blood lead levels (BLL) were determined by the instrument Leadcare. A comparison with the graphite furnace atomic absorption technique was performed in order to validate the Leadcare results. Environmental samples were analyzed by inductively coupled plasma atomic emission spectroscopy. Among 361 capillary samples, mean BLL of the communities exposed and non-exposed to the oil activity were not significantly different. Pb levels in environmental samples were below the maximum permissible levels. The sources of exposure could not be identified. Elevated levels of Pb in the oil-non-exposed community pointed out at other sources not yet clarified (Anticona, Bergdahl, Lundh, Alegre, & Sebastian, 2011). Beck, L. and T. Bernauer in 2011 focused on the ZRB because it is both substantively important and analytically challenging in terms of demonstrating the value of our methodological approach: The results indicate that current water abundance in most parts of the ZRB is unlikely to last. While, perhaps surprisingly, climatic changes are likely to have only relatively small effects on water availability, population and economic growth as well as expansion of irrigated agriculture and water transfers are likely to have very important transboundary impacts. Such impacts involve drastically reduced runoff in the dry season at key locations and changing (relative) shares of ZRB countries in the basin's total runoff and water demand. These results imply that effective governance mechanisms for water allocation and for dealing with flow variability should be set up within the next few years in order to manage the situation cooperatively (Beck &Bernauer, 2011). Tuikka, A. I., C. Schmitt, et al. in 2011 assessed of the toxicity of four polluted sediments and their corresponding reference sediments from three European river basins were investigated using a battery of six sediment contact tests representing three different trophic levels. The msPAF and TU-based toxicity estimations confirmed the results of the biotests by predicting a higher toxic risk for the polluted sediments compared to the corresponding reference sediments, but partly having a different emphasis from the biotests. The results demonstrate differences in the sensitivities of species and emphasize the need for data on multiple species, when estimating the effects of sediment pollution on the benthic community (Tuikka et al., 2011). Bonachea, J., V. M. Bruschi, et al. in 2010 determined whether an acceleration of geomorphic processes has taken place in recent years and, if so, to what extent it is due to natural (climate) or human (land-use) drivers. The study results obtained indicate that sedimentation rates during the last century have remained essentially constant in a remote Andean basin, whereas they show important increases in the other two,Bishop, C. A., P. Ng, et al. in 1998 assessed developmental abnormalities in embryos and hatchlings from eggs of the common snapping turtle (Chelydraserpentinaserpentina). The study found a significant increase in abnormal development with increasing polychlorinated aromatic hydrocarbon exposure in eggs, particularly PCDD and PCDF concentrations. In contrast, the risk of abnormality was not significantly higher as toxic equivalent concentrations increased in eggs. The study also found significant 7-ethoxyresorufin O-deethylase and Cytochrome P4501A responses in livers of hatchling turtles from Lake Ontario relative to hatchlings from a clean, inland site whereas we did not find any evidence of porphyria in the hatchlings from either site (Bishop et al., 1998).

CONCLUSION

As the objectives of the study to review of empirical evidence on the impact of polluted river water in the context of environmental risk as well as Ecological Risk in the river basin area over the world. In general, the review findings concluded that polluted river water are seriously caused for hampering of the Sustainable Development (SD) especially in the context of sustainable development, ecosystems change, sustainable livelihoods, land cover, ecosystems, environmental sensitivity, biodiversity and geo-diversity as well as social and economic arena in a river basin over the world. Moreover, the study also identifies that Flow velocity in the river is most sensitive parameter to Nitrobenzene concentration in water column based on sensitivity analysis of input parameters and the organic pollutants were the main contributing factor to the toxicity of effluents from textile and dyeing plants, pulp and paper mills, fine chemical factories and municipal wastewater treatment plants. On the other hand, the study also indicates that upstream industrial and municipal wastewater discharges along the river bank are major sources of pollution. The accumulation factor and potential ecological risk index indicate that the sedimentation at the Salt River mouth has the most serious degree of Cu accumulation and the highest ecological potential risk. Furthermore, it has noted in this review that the salinity was one of the major stresses affecting macro invertebrate assemblages, whereas antioxidant and metabolizing enzymes responded differently and were closely related to high and presumably toxic levels of accumulated organic pollutants. Therefore these results indicate that the use of multiple -markers sensitive to water pollution may provide complementary information to diagnose environmental factors that are impairing macro invertebrate communities. On the other hand, few studies emphasize the importance of combining biological indices with biomarkers and more generalized and ecologically relevant (grazing) in situ responses to identify ecological effects of effluent discharges from sewage treatment plants in surface waters. Moreover, quantification of sensitivity of impact assessment to value assignment shows that a model like BIO-SAFE is relatively insensitive to assignment of values to different policy and legislation based criteria. It is also possible that groundwater is being polluted by infiltration of industrial effluent but similarly there has been no empirical research into this. The problems of diarrhea and dysentery are unlikely to be caused directly by the industrial effluent, as they are usually the result of microbial contamination. However, the high level of in-migration to the area is putting considerable pressure on poor sanitation infrastructure and may be increasing the risk of contracting communicable diseases. By using of river water for washing clothing and bath many water born disease spread man to man. However, yellow fever, cholera, dengue, malaria and other epidemic disease also available in this area. The people lives in the aria are also suffering by the odor pollution and by the respiratory problems. For the polluted situation of the river maternal and child health of nearby riverbank slam are in a danger position.

REFERENCES

- P. H. McGauhey, “Engineering Management of Water Quality,” 1968.
- H. Peavy, D. Rowe, and G. Tchobanoglous, “Environmental Engineering,” 1986.
- M. Abedin, “Health and Population Sector: An Overview and Vision,” in Logical Framework (Log-Frame) Workshop for the Fifth Health and Population Programme (HAPP-5), pp. 23–25, 1997.
- S. Ahmed, K. Tapley, A. Clemett, and M. Chadwick, “Health and Safety in the Textile Dyeing Industry,” 2005.
- K. Akhter, “Studies on Water Quality in the Peripheral River System Around Dhaka City,” 2007
- M. Ahmed, “Sector Review Industry, Environmental Management Training Project Instructor,” 1993. [7] M. Ahmed and M. Rahman, “Water Supply and Sanitation,” 2000.
- D. Bhattacharya, B. Kabir, and K. Ali, “Industrial Growth and Pollution in Bangladesh: A sectoral Analysis,” in Symposium on” Environment and Sustainable Development with Special Reference to Bangladesh”, North South University, Dhaka, 1995.
- G. Browder, “Final Report of Water Quality Management Task (ADB TA1104-BAN),” National Environmental monitoring and Pollution Control Project, The Asian Development Bank, 1992.
- BBS, “Report of Health and Demographic Survey,” 2000.
- Almansa, C., J. Calatrava, J.M. Martínez-Paz, 2012. Extending the framework of the economic evaluation of erosion control actions in Mediterranean basins. Land Use Policy, 29(2): 294-308
- Anh, P.T., C. Kroeze, S.R. Bush, A.P.J. Mol, 2010. Water pollution by intensive brackish shrimp farming in south-east Vietnam: Causes and options for control. Agricultural Water Management, 97(6): 872-882
- Anticona, C., I.A. Bergdahl, T. Lundh, Y. Alegre, M.S. Sebastian, 2011. Lead exposure in indigenous communities of the Amazon basin, Peru. International Journal of Hygiene and E nvironmental Health, 215(1): 59-63
- Arkoosh, M.R., D. Boylen, J. Dietrich, B.F. Anulacion, GinaYlitalo, C.F. Bravo, et al., 2010. Disease susceptibility of salmon exposed to polybrominateddiphenyl ethers (PBDEs). Aquatic Toxicology, 98(1): 51-59
- Baoxing, Q., 2005. China says water pollution so severe that cities could lack safe supplies. From http://www.chinadaily.com.cn/english/doc/2005-06/07/content_449451.html.
- Boeije, G.M., J.O. Wagner, F. Koormann, P.A. Vanrolleghem, D.R. Schowanek, T.C.J. Feijtel, 2000. New PEC definitions for river basins applicable to GIS-based environmental exposure assessment. Chemosphere, 40(3): 255-265.

- Bogen, J., 2009. The impact of environmental changes on the sediment loads of Norwegian rivers. CATENA, 79(3): 251-256
- Bonachea, J., V.M. Bruschi, M.A. Hurtado, L.M. Forte, M. da Silva, R. Etcheverry, et al., 2010. Natural and human forcing in recent geomorphic change; case studies in the Rio de la Plata basin. Science of The Total Environment, 408(13): 2674-2695
- Bonzongo, J.C.J., B.W. Nemer, W.B. Lyons, 2006. Hydrologic controls on water chemistry and mercury biotransformation in a closed river system: The Carson River, Nevada. Applied Geochemistry, 21(11):1999-2009
- Chilundo, M., P. Kelderman, J.H. O´keeffe, 2008. Design of a water quality monitoring network for the Limpopo River Basin in Mozambique. Physics and Chemistry of the Earth, Parts A/B/C, 33(8-13): 655- 665
- Damásio, J., M. Fernández-Sanjuan, J. Sánchez-Avila, S. Lacorte, N. Prat, M. Rieradevall, et al., 2011. Multibiochemical responses of benthic macroinvertebrate species as a complementary tool to diagnose the cause of community impairment in polluted rivers. Water Research, 45(12): 3599-3613
- Eljarrat, E., M.Á. Martínez, P. Sanz, M.Á. Concejero, B. Piña, L. Quirós, et al., 2008. Distribution and biological impact of dioxin-like compounds in risk zones along the Ebro River basin (Spain). Chemosphere, 71(6): 1156-1161.
- Fang, Y.X., G.G. Ying, L.J. Zhang, J.L. Zhao, H.C. Su, B. Yang, et al., 2012. Use of TIE techniques to characterize industrial effluents in the Pearl River Delta region. Ecotoxicology and Environmental Safety, 76(0): 143-152
- Tuikka, A.I., C. Schmitt, S. Höss, N. Bandow, P.C. von der Ohe, D. de Zwart, et al., 2011. Toxicity assessment of sediments from three European river basins using Van Sprang, P.A., F.A.M.
- Verdonck, F. Van Assche, L. Regoli, K.A.C. De Schamphelaere, 2009. Environmental risk assessment of zinc in European freshwaters: A critical appraisal. Science of The Total Environment, 407(20): 5373-5391
- Varol, M., 2011. Assessment of heavy metal contamination in sediments of the Tigris River (Turkey) using pollution indices and multivariate statistical techniques. Journal of Hazardous Materials, 195(0): 355-364.