# FLOODS AS A GLOBAL PROBLEM ON A GLOBAL SCALE

**Makhmudov A.A**
*Senior lecturer of the Institute of Civil Protection at the Academy of the Ministry of Emergency Situations of the Republic of Uzbekistan*

**Annotation:** *This article is devoted to the floods that took place in various countries of the world, the history of floods, flood damage, as well as the analysis and forecasting of floods in the development of flood prevention measures of civil protection in ensuring the state of emergency in the event of emergencies.*

**Keywords:** *Floods, spring floods, prolonged rains and downpours, a comprehensive study of the damage caused by each of these floods, pathogens of infectious diseases, natural focal infections of malaria, leaching of cesspools, climate change, civil protection, state of emergency.*

**Аннотация:** *Данная статья посвящена наводнениям имевшим место в различных странах мира, история наводнений, ущерб от наводнений, а так же анализ и прогнозирование наводнений при разработки противопаводковых мероприятий гражданской защиты в обеспечении режима чрезвычайном положения при возникновении чрезвычайных ситуаций.*

**Ключевые слова:** *Наводнения, весенние половодия, затяжние дожди и ливни, всестороннего исследования ущерба, причиненного каждым из таких наводнений, возбудителями инфекционных заболеваний, природно очаговых инфекций малярии, вымывание выгребов, климатические изменения, гражданская защита, чрезвычайного положения.*

**Annotatsiya** *Ushbu maqola dunyoning turli mamlakatlarida sodir bo‘lgan toshqinlar, toshqinlar tarixi, toshqinlardan etkazilgan zarar, shuningdek favqulodda vaziyatlar yuzaga kelganda favqulodda vaziyatni ta’minlashda fuqaro muhofazasi bo‘yicha toshqinlarni tahlil qilish va bashorat qilishga bag‘ishlangan.*

**Kalit so‘zlar:** *Toshqinlar, bahorgi toshqinlar, uzoq muddatli yomg‘irlar va jalalar, bunday toshqinlarning har biri, yuqumli kasalliklarning qo‘zg‘atuvchilari, bezgakning tabiiy fokal infeksiyalari, qirg‘oqlarni yuvish, iqlim o‘zgarishlar, fuqaro muhofazasi, favqulodda holatlar natijasida etkazilgan zararni har tomonlama o‘rganish.*

Floods are considered as a historical category. It is shown that the frequency of floods increases from century to century. For the first time, the idea of flooding as a global phenomenon accompanying humanity from ancient times to the present day is given. The article focuses on geographical and socio-economic problems. The floods of 1997-2016, which occurred on all continents of the globe, are characterized. Data on the scale of floods are provided and analyzed for each continent: their number, duration, number of

victims and temporarily evacuated, damage in dollars. The most relevant aspects of flood research are indicated. For thousands of years, people have been struggling with floods, but they cannot succeed in this event in any way. On the contrary, flood damage, especially in recent decades, is growing at an incredible rate. The flood area of dangerous territories on the globe is 3 million km2, which is comparable to the total area of all Western European states. ~ 1 billion people live in flood-prone areas. human. Annual losses from floods amount to tens of billions of dollars, and in some years exceed 200 billion dollars.

In 1998, 240 million people were affected by floods in China alone, and paradoxically, until now, floods have not been considered as a phenomenon of a planetary scale in any of the scientific works. There are no generally accepted concepts of calculating damages caused by floods, just as there are no concepts of protection against them. Legends about the great flood, in which almost all of humanity perished, are spread all over the world. Many researchers believe that a significant part of the legends about the flood is based on the catastrophes that actually occurred in different parts of the globe over the past few millennia. Research by archaeologists, biologists, historians and ethnographers has established that in the first half of the fourth and third millennia BC in Mesopotamia there were great floods. The population living in the valley of the Tigris and Euphrates, the areas inhabited by them between the mountains and the desert, seemed to be the whole world. Therefore, catastrophic floods, in which most of the inhabitants of the valley died, were associated with a worldwide flood for the few survivors. It is suggested that one of these floods, which is mentioned in the Sumerian legend, served as the basis for the story of the flood in the Old Testament. Now historians, archaeologists and other specialists have done a lot of work on the study of legends about the great flood in different countries. From the list of these legends, it can be judged that major floods, as in our time, occurred in almost all areas of the globe. So, here is a list of legends about the great flood: Babylonian, Hebrew, ancient Greek, ancient Indian, as well as legends about the great flood in East Asia, on the islands of the Malay Archipelago, in Australia, in New Guinea and Melanesia, in Polynesia and Micronesia, in South America, in Central America and Mexico, in North America, in Africa. The main difference between our time and the bygone centuries is that with population growth, deforestation and many other human activities, floods, including destructive ones, began to occur more and more often. Li Lukang gave very interesting data in his report made at the international scientific and industrial forum "Great Rivers 99" in Nizhny Novgorod. Based on this report and other literary sources, we can say with good reason that the history of China is to some extent the history of flood control. The inhabitants of the country faced the problem of floods under all the feudal dynasties of China. To organize optimal flood protection, reliable knowledge about floods and the damage caused by them is necessary. Unfortunately, at present, not only the inhabitants of our planet, but also specialists do not have objective information about the global scale of this phenomenon. The press, as a rule, highlights the largest floods that have occurred

in a particular country. However, a systematic, comprehensive study of the damage caused by each of these floods is not being carried out even at the present time. Data that could be used and thoroughly analyzed by specialists to develop rational measures to combat a natural disaster are not published. Floods generate a whole range of problems reflecting the relationship between nature and human society. The issues of organizing the protection of territories and preventing or minimizing damage from floods and floods are of interest to the population in almost all parts of the world. But, paradoxically, one of the greatest disasters of mankind is floods, which have claimed hundreds of millions of people over the last millennium. lives, still not only do not have a generally accepted concept of dealing with them, but also any reliable accounting of the consequences caused by them.

And this is despite the fact that in the last decades of the twentieth century, catastrophic floods and the extent of damage caused by them have increased dramatically. So, in 1998, 13 floods were recorded in China, which affected almost the entire territory of the country. 240 million people were affected by them. Over 56 million people had to be temporarily evacuated. Thousands of people died. The increase in damage is also evidenced by data on the United States. Average annual flood damage in the early twentieth century . In this country it was $ 100 million, in the 80s it exceeded $ 1 billion, and recently in some years it exceeds $ 10 billion. Ordinary floods are quickly erased in human memory. The memory of catastrophic floods has been alive for many centuries. As already mentioned, China belongs to the number of countries that are particularly suffering from floods. Territories subject to flooding, especially long-term, when the water has been standing for many months, belong to areas with an environmental emergency. Conditions are created here for the development of aquatic and near-aquatic organisms that are causative agents of infectious diseases and naturally focal malaria infections. The leaching of cesspools, and in our time, sewage facilities, leads to a chain of subsequent epidemiological complications associated with intestinal infections. Famine and the accompanying experiences of the victims often claim more than 181 lives than disasters during the flood itself. Therefore, the figures given by unofficial sources often more truthfully reflect the number of victims caused by floods. There is no complete picture that gives an idea of floods on a global scale over the past years in any literary source. For example, here is how the largest floods on the globe are characterized in the book "Natural Disasters: Study and Methods of Struggle" (New York, London, Toronto, 1974, published in translation into Russian in the publishing house "Progress". M.1978),

On the territory of Russia, floods are caused by almost all causes known in the world: in most parts of the country - spring floods, prolonged rains and downpours; in the Far East, rains and downpours as a result of cyclones; on rivers flowing into the Arctic Ocean, ice jams and congestion. in recent years, floods have also occurred as a result of the breakthrough of dams of reservoirs. There is a tsunami on the coasts of the Far East, and in the west in the Gulf of Finland there are floods. As in all countries of the world, human activity in watersheds, deforestation, agricultural land development, construction of

various kinds of structures, asphalting has led to an increase in the power and duration of floods. This was also facilitated by various activities in the valleys and, in particular, in the floodplains of rivers. Flood damage in the last decades of the last century is estimated according to S. Bednaruk and E. Ovcharov at hundreds, and in some years billions of rubles. 35% of flood damage falls on the municipal sector, 27% on agriculture, 14% on industry and 8% on transport routes, 16% - other. The most complete data on floods in Russia are given in the book by A. Taratutin "Floods on the territory of the Russian Federation", which has just been published. For many years, cooperating with various organizations, A. Taratutin collected data on floods and the damage caused by them. The percentage of available, at the same time very incomplete data on damage from recorded floods ranges from 6.6 to 62.5% for 15 administrative units. At the same time, in more than half of them it does not exceed 25%. It is surprising that the worst situation is taking into account flood damage in the Volga and Don River basin 6.6% and in the North-Western Economic Region 7%. Things are not much better at the present time. Having read the materials on floods presented by the press service of the Ministry of Emergency Situations of Russia on the Internet, I would like to express the following considerations. Daily information about emergency situations caused by floods is undoubtedly useful for familiarizing the leadership of the Ministry of Emergency Situations, which can, as they say, keep abreast of the pulse and probably contribute, if necessary, to prompt intervention in the situations that arise. But it seems that it is necessary to consider their greater informativeness and standardization. The analysis of emergency situations for the year is very formal and uninformative. It lacks scientific and practical conclusions. Taking into account the comments made in future work, from our point of view, would dramatically increase the scientific and practical significance of these materials. It seems to us that the materials on each flood should be systematized, analyzed, drawn conclusions and published annually in summary reports in separate books. The review of floods in the book "Catastrophes of the late twentieth century" is informative and of significant interest to specialists dealing with this problem. This opinion was made on the basis of acquaintance with two articles "Typhoon and flood in Primorsky Krai" (1989) and "Breakthrough of the Kiselevsky Reservoir dam" (1993). The most complete picture of floods in the scale of the globe was made for the first time thanks to the work carried out by the team of the Dartmouth Observatory at Hanover College in the USA. Since 1996 and to this day, its employees collect flood data using a variety of sources: official government reports, data from meteorological services, television and radio news, newspaper and magazine materials. Taking into account the diversity of the material obtained for individual countries from different sources and, presumably, based on different methods of calculating flood damage, as well as the incompleteness of the materials provided, there is currently no reason to assert that the processed materials give an adequate picture of the disasters caused by floods in 1997-2000. But the first steps in this direction have undoubtedly been taken. It is very important that the world community does not stop and year by year

improves the methodology for collecting data on floods in different countries. It seems to us that all States should pay attention to this problem. Since the number of victims of natural disasters is reported by many media outlets that show great interest in this, we can assume that the figures indicating the number of deaths during the floods are sufficiently reliable. Data on temporarily evacuated from flood zones are less reliable. But the given order of figures does not cause much doubt, with the exception of the death toll in Nigeria. We do not provide data on the areas of flooding, because they are available in the work of the Dartmouth Observatory for less than one-third of floods, and besides, in some cases, they do not characterize the total area of flooding, but the area of agricultural, and in most cases only arable land, on which the crop died.

Data on flood damage should be treated with great caution, since the method of calculating damage in different countries is unknown. In most cases, direct damage associated with direct physical contact of flood waters with economic facilities is usually taken into account. The amount of damage is usually determined by the cost of restoring the economy or the current market value of destroyed (or disrupted) economic facilities. Thus, damage is assessed from the violation or destruction of household and residential buildings, property located in them, as well as from the destruction of bridges, roads and railways, communication and power transmission lines, gas and oil pipelines. In agriculture, the damage is determined in most cases by the loss of agricultural products, the cost of restoring disturbed soil fertility. This also includes the costs of property insurance payments in the event of natural disasters, one-time payments of monetary and in-kind benefits, as well as the costs of organizing rescue measures, including evacuation of the population and removal of material and technical valuables, construction of temporary protective structures, etc. Indirect damage, which is losses due to violations of economic relations, decline in production, trade and banking operations, etc. Indirect damage, for which there are still no generally accepted methods of assessment, can affect for many years after a flood. With that said, we believe that the damage figures cited can be considered overstated rather than overstated. Our processing and analysis of the data collected by the staff of the Observatory at Hanover College make it possible to state with a sufficient degree of reliability about the number of floods that took place in 1997-2000, on their distribution by continents, months, and duration of floods. The following are the primary materials of the staff of the Observatory at Hanover College, summarized by us in diagrams. We believe that after reading them, the reader will get a more or less objective idea of the floods of 1997-2016, about their distribution both in absolute numbers and percentages by continent, about the distribution of floods by month on all continents and about their duration in days. Of all the countries in the world, Bangladesh suffers the most from floods. The flat territories flooded by the Ganges, Brahmaputra, Meghna rivers and small rivers make up ~ 80% of the total area of the country. Floods in Bangladesh have become a regular occurrence. At this time, the life of the country is completely paralyzed. People have to escape on the hills, on high embankments, on the roofs of houses and even

on trees and stay there without food and drinking water until help comes. Thirteen tropical cyclones hit the coast of this country in the period from 1960 to 1970. From 1950 to 1988, 25 major floods occurred in Bangladesh. In 1970 300 thousand people died from the flood. The attention of the whole world was riveted by the floods of 1987 and 1988 . According to official estimates, in 1988, out of the total area of the country's territory equal to 144.8 thousand km2, more than half of 82 thousand km2 were flooded, 7.2 million houses were affected by flooding, 2,379 people died, 172 thousand cattle, 2 million tons of rice. 3,000 km of trunk roads and 10,000 km of rural roads, 898 bridges and underground pipelines, 1,300 km of railways and 270 railway bridges were flooded. 1990 km of flood dams, 283 km of irrigation canals, 18 power plants, 2000 km of power lines, more than 1000 industrial enterprises, 1400 hospitals, 19 thousand schools were affected. We have specifically provided such detailed data to show that usually the most frequently cited figures on the number of dead and temporarily displaced residents do not exhaust the nature of disasters caused by floods. But it is possible to assess flood damage and outline the necessary flood prevention measures only if there is reliable and complete data on the scale of violations caused by floods. Without these data, it is impossible to develop specific measures for flood prevention and protection against them. The trend of a significant increase in flood damage in all countries of the world, including Russia, is caused primarily by increased economic development in flood-prone areas. It follows from the long-term experience of all countries of the world that engineering and technical measures do not provide one hundred percent protection from floods, since they cannot prevent the main causes of damage growth. It is necessary to develop and adopt a unified concept for the organization of flood protection, including both engineering and non-engineering measures. Moreover, the latter should be aimed mainly at encouraging land users to organize farming in flood zones in such a way that in the event of a natural disaster, damage would be minimized. The management of the economic use of the floodplain means, first of all, the restriction or complete prohibition of such types of economic activities, as a result of which it is possible to increase flooding, as well as the expansion of measures aimed at creating conditions for reducing the maximum runoff. In areas subject to periodic flooding, forestry should be restricted or completely prohibited, and at the same time, the maximum possible for reforestation should be done. During the development of agriculture, certain agrotechnical methods of cultivating the land must be carried out without fail, in particular with the mandatory use of zabi, the runoff from which (depending on geographical conditions) is less than from stubble or from a deposit by 2-3 times. In areas with highly developed erosion, contour plowing should be carried out or arable tillage should be abandoned altogether, switching to non-fallow. All this should be carried out on the basis of the application of the entire available complex of agroforestry measures. In addition, it is necessary to limit all types of economic activities that are significantly damaged during floods (for example, the placement of capital-intensive industries and valuable objects). According to flood forecasting data and on the basis of

zoning according to the degree of flooding of various security, such types of economic activities should be selected and carried out that will suffer the least damage during flooding. In principle, if the construction of protective engineering structures is associated with unacceptable costs, and the passage of a catastrophic flood is associated with severe consequences and high costs, it is possible to withdraw the territory from economic use with its transformation into a national park, a protected area, etc. To select the most rational types of economic activity, models should be used that use data on the availability and frequency of floods and floods in various conditions, data on the effectiveness of various protective measures, as well as criteria for socio-economic conditions (composition and number of population, employment structure, etc.). The predicted warming of the climate and the inevitable further growth of economic development of river valleys will undoubtedly lead to an increase in the frequency and destructive power of floods. Therefore, the urgent task of the Governments of all countries of the world and various local authorities is to develop effective flood prevention and protection measures. It should not be forgotten that the prevention of natural disasters will reduce the cost of flood relief by 50-70 times. It seems that the implementation of our proposed concept can play a significant role in reducing disasters and damage caused by floods. In this regard, the implementation of each point of the proposed concept undoubtedly plays an important role, but a significant effect can be achieved only with the full implementation of all proposed measures and actions.

1. During the economic development of flood-prone areas, both in river valleys and on sea coasts suffering from overburden floods and tsunamis, detailed technical and environmental studies should be carried out. Their goal is to identify ways to obtain the maximum possible economic effect from the development of these territories and at the same time minimize possible damage from floods. Identifying the optimal solution to this most difficult task and its practical implementation is a reliable foundation on which all the other provisions of the concept listed below are based.

2. When developing flood control measures in river valleys, the entire catchment area should be considered, and not its individual sections, since local flood control measures that do not take into account the entire flood situation in the river valley may not only not have an economic effect, but also significantly worsen the situation as a whole and lead to even greater flood damage as a result.

A set of measures in flood-prone areas, including forecasting, planning and implementation of works, should be carried out before the onset of a flood, during its passage and after the end of a natural disaster. The current state of flood forecasting and calculation, the organization of economic use of flood-prone areas, the assessment of the consequences of floods for the economy, social and environmental conditions clearly indicates the need, first of all, for reliable accounting of damage caused by floods and the development of effective measures to combat them. At its core, the problem of floods is global and complex.

Based on the above , the following conclusions can be drawn

1. Floods accompany human society from ancient times to the present day.

2. Due to various reasons, floods occur in the basins of all rivers of the globe, as well as on significant areas of the coasts of oceans and seas (surge floods, tsunamis).

3. In terms of the number of victims and damage caused to society, floods occupy the first place among natural disasters, however, paradoxically, there are still no reliable long-term forecasts of their occurrence, reliable and generally accepted methods of calculating the damage caused by them and a generally accepted concept of protection.

4. Recently, especially in the second half of the twentieth century, the causes of anthropogenic floods and the extent of damage caused by them have been growing.

5. Over the historical period, there has been a clear increase in the intensity and destructive power of natural floods.

6. In the future, due to a number of natural and anthropogenic causes, the damage caused by floods will increase, therefore, it is urgently necessary to strengthen research, organizational and practical work aimed at reducing damage from floods.

7. Our proposed flood protection concept can serve as a basis for further detailed developments in this direction.

8. Special and urgent attention of scientists, designers and statesmen should be paid to those areas where the bottom of the rivers is higher than the surrounding area, because without the slightest exaggeration it can be said that the population of these areas lives like on a volcano.

9. Given the global scale of the problem, its research and practical solution should be given the most serious attention by the relevant government bodies of all countries and international organizations.

**LITERATURE:**

1. Авакян А.Б. Наводнения. Концепция защиты // Известия РАН. Сер. географическая. 2000. № 5. С. 40-46.

2. Авакян А.Б., Истомина М.Н. Наводнения в мире в последние годы XX в. // Водные ресурсы. 2000. Т. 27. № 5. С. 517-523.

3. Авакян А.Б., Полюшкин А.А. Влияние наводнений на жизнь общества и защиты от них // Известия АН СССР. Сер. географическая. 1989. № 2. С. 42-54.

4. Авакян А.Б., Полюшкин А.А. Наводнения. Проблемы определения ущербов и защиты // Водные ресурсы. 1991. № 4. С. 114-125.

5. Джеймс Джордж Фрейзер. Фольклор в ветхом завете. М.: Издательство политической литературы. 1986. 510 с.

6. Катастрофы конца XX в. Под ред. В.А. Виноградова. М.: УРСС. 1998. 398 с.

7. Ли Луканг. Анализ катастрофических наводнений в бассейне р. Янцзы в 1998 г. Генеральные доклады по проблемам экологического оздоровления великих рек мира. Н. Новгород. ВАО «Нижегородская Ярмарка». 1999. Т. 1. С. 349-363.

8. Муранов А.П. Река Хуанхэ. Л.: Гидрометеоиздат. 1957. 87 с.

9. Муранов А.П. Река Янцзы. Л.: Гидрометеоиздат. 1959. 124 с.

10. Нежиновский Р.А. Наводнения на реках и озерах. Л.: Гидрометеоиздат. 1988. 183 с.

11. Стихийные бедствия: изучение и методы борьбы. М.: «Прогресс». 1978. 416 с.

12. Сообщения пресс-службы МЧС России. Справки Министерства РФ по делам Гражданской обороны и чрезвычайным ситуациям, и ликвидации последствий стихийных бедствий. http://www.emercom.gov.ru

13. Таратутин А.А. Наводнения на территории Российской Федерации. Екатеринбург: РосНИИВХ. 2000. 375 с.

14. Уайт Гильберт. География, ресурсы и окружающая среда. М.: «Прогресс». 1990. 543 с.

15. Хлопин И.Н. А что было до потопа? Л.: Лениздат. 1990. 154 с.

16. Bednarouk S., Ovcharov E. Flood Prevention and Protection in Russian. United Nation. Seminar on Flood Prevention and Protection. Berlin, 7-8 oct. 1999. № 37. P. 1-4.

17. Brammer H. Floods in Bangladesh, I - Geographical Background to the 1987 and 1988 Floods // Geographical Journal. GEOAREA: Southeast Asia, Bangladesh. 1990. Vol. 156. Part 1. P. 12-22.

18. Destructive Water: Water-Control Natural Disasters, Their Abatement and Control. JAHS Publ. 1997. № 230. 397 p.

19. Flood damage prevention and control in China. Report of a study Four and Workshop in the Peoples Republic of China // Nature. Resource. Water ser. 1983. № 11. 121 p.

20. Global Register of Large River Flood Events (1997-2000). Dartmouth Flood Observatory Department of Geography, Dartmouth College. Hanover NH 03755 USA. http://www.dartmouth.edu/artsci/geog/floods/

21. Milne A. Floodshoock: The Drowning of Planet Earth. Sutton. 1986. 176 p. 22. Ward R. Floods: A Geographical Perspective. London; Basingstoke: Mac Millan Press, 1978. 244 p.