RESEARCH PAPERS OF WROCŁAW UNIVERSITY OF ECONOMICS No. 134
Economics 8 2010

Zbigniew Piepiora
Wrocław University of Economics

COUNTERACTING THE RESULTS OF NATURAL DISASTERS IN THE REGION OF SOUTH ASIA

Abstract: The number of natural disasters increases in the region of South Asia. Their occurrence often causes death or injuries of many people. Destroying the public and private property is the result of the natural disasters which contribute to boosting the costs of living and to deteriorating the quality of life in the examined region. In the face of these alarming facts it is necessary to make the analysis of these kind of phenomena and of counteracting their results. It is the aim of this article.

Keywords: natural disaster, South Asia, counteracting, result.

1. Introduction

The Region of South Asia includes the following countries: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. These states are characterized by political, economic and social diversity. They have got a great tourist-potential related to archeological monuments that remained after ancient civilizations, a rich and unique cultural variety, but also extremely diversified and vast geographical configuration with many historic and religious areas. These countries are threatened by the occurrence of natural disasters.

According to various sources the number of natural disasters in the region of South Asia increases. They often cause death or injuries of many people and in the result deteriorate the quality of life in the region. In the face of these alarming facts it is necessary to make the analysis of these kind of phenomena and of counteracting their results.

The aim of this article is to present the results of the chosen natural disasters in the region of South Asia. The author conducts the analysis of the occurrence of these kind of phenomena and their influence on the environment. Then, the international cooperation for counteracting the results of the natural disasters in this region is presented.

2. Natural disasters – the definition according to the United Nations

Within the confines of the execution of the International Strategy for Disaster Reduction, the United Nations (UN/ISDR) defines the disaster as a serious disruption in the functioning of either community or a society involving widespread human, material, economic or environmental losses or impacts. It exceeds the ability of the affected community or society to cope with it using its own resources. The disaster results from the combination of:[1]

– the exposure to a hazard,
– the vulnerability to injuries,
– the insufficient capacity or measures to reduce or cope with the potential negative consequences.

According to the UN/ISDR, the disaster may cause damages such as loss of life, injury, disease and other negative impacts on man's physical, mental and social well-being, including the damage of property, the destruction of estates, services, social and economic disruption and environmental degradation. According to the UN/ISDR the hazards that potentially cause disasters are either technological or natural. Further,

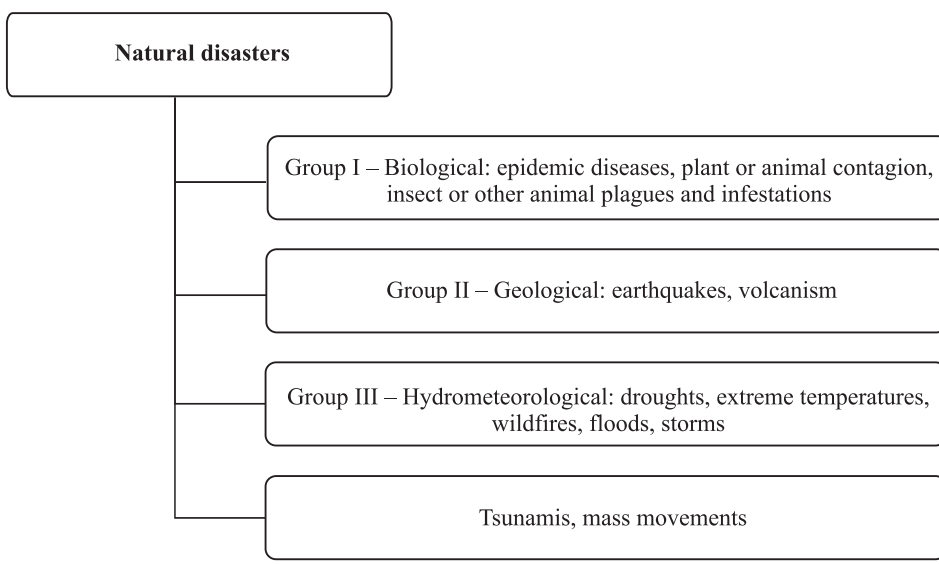

Figure 1. The classification of natural disasters according to the UN/ISDR

Source: own study on the basis of: *UN/ISDR Terminology on Disaster Risk Reduction*, UN/ISDR, Geneva 2009, pp. 2, 7, 8.

[1] *UN/ISDR Terminology on Disaster Risk Reduction*, UN/ISDR, Geneva 2009, p. 4.

it marks out three groups of hazards and natural disasters: biological, geological and hydrometeorological (Figure 1).[2]

The first group is represented by processes or phenomena of organic origin or transmitted by biological carriers, including the exposure to pathogenic micro-organisms, toxins and bioactive substances. Examples of biological hazards are: insect or other animal plagues and infestations, outbreaks of epidemic diseases, plant or animal contagion. They can cause loss of life, injuries, illnesses or other negative health impacts, property damages, loss of livelihoods and services, social and economic disruption, or environmental damages.[3]

The second group is constituted by geological processes or phenomena such as internal earth processes, earthquakes, volcanic activity and emissions. The geological disasters may cause loss of life, injuries or other health impacts, property damages, loss of livelihoods and services, social and economic disruption, or environmental damage.[4]

The third group includes: avalanches, blizzards, coastal storm surges, cold spells, droughts, floods (including flash floods), hailstorms, heatwaves, heavy snowfalls, tropical cyclones (also known as typhoons and hurricanes), thunderstorms, tornadoes. These processes or phenomena, which are of atmospheric, hydrological or oceanographic nature, may cause loss of life, injuries or other health impacts, property damages, loss of livelihoods and services, social and economic disruption, or environmental damages. The hydrometeorological conditions can also cause other disasters, such as: epidemics, landslides, locust plagues, wildland fires, and spreading of toxic substances and volcanic eruption material or transport disasters.[5]

Hydrometeorological factors are important contributors to some of geological disasters and related geophysical processes such as debris and mud flows landslides, rockslides, surface collapses and other mass movements. They are difficult to categorize. Similarly, tsunamis – although they are triggered by undersea earthquakes and other geological events – are essentially oceanic processes causing disastrous floods on the coasts.[6]

3. The profile of the region of South Asia

South Asia is a part of Asia including countries of the India sub-continent, south from the Himalayas (see Figure 2). The climate of South Asia is dominated by the South-West monsoon, with temporal and spatial variations in temperature and rainfall

---

[2] See also: Z. Piepiora, Przeciwdziałanie skutkom katastrof naturalnych w regionie Azji Południowo-Wschodniej, [in:] B. Drelich-Skulska (Ed.), *Integracja Azji Wschodniej. Mit czy rzeczywistość*, Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu nr 67, Wydawnictwo Uniwersytetu Ekonomicznego, Wrocław 2009, p. 234.

[3] *UN/ISDR Terminology*…, p. 2.

[4] *Ibid*., p. 7.

[5] *Ibid*., pp. 7, 8.

[6] See also: Z. Piepiora, *op. cit*., p. 234.

in the whole region. Most of the countries in this region have a large rural population dependent on agriculture concentrated around the major rivers of South Asia – the Indus, Ganges, Brahmaputra, Meghana, and their tributaries. These rivers provide sustenance for more than 500 million people of the region, supplying drinking water, fisheries, hydropower, inland navigation, irrigation. Moreover, they contribute to biodiversity on the wetlands.[7]

Figure 2. South Asia

Source: *Azja Pacyfik – wszystko o Azji Południowej*, http://www.azjapacyfik.pl/index_2501.php?b_2501=110 (20.02.2010).

South Asia is marked by diverse areas, cultural legacy, colonial experience, geography, natural resources, population, stage of development and system of government. The region occupies approximately 3.2% of the earth area and it has above 1.5 billion inhabitants – one quarter of the world population. It houses one of the most populous countries in the world, India, with population above one billion inhabitants, as well as one of the smallest countries on the Earth – Maldives, with population of only 300,000 in year 2006 (Table 1). Annual population growth rate is 1.9%, with the highest rate in Afghanistan amounting to 4.1%. A remarkable increase of population causes the increase of population density, which is 1072.2 persons per 1 km^2 in Bangladesh, but 400 persons/km^2 in the entire region. The increase of population density poses a threat because land resources are being gradually limited. Pakistan and Maldives has got the highest urbanization rates (above 30%.) The growing urban development puts pressure on urban infrastructure, such as the concentration of the poor cities. Apart from the existing physical and environmental factors in South Asia, these poor social and economic conditions entail the increase of vulnerability to damages caused by natural disasters.[8]

[7] M.S. Shrestha, Impact of floods in South Asia, [in:] A. Khan (Ed.), *Journal of South Asia Disaster Studies*, No. 1, SAARC Disaster Management Centre, New Delhi, November 2008, p. 86.

[8] See also: Z. Piepiora, *op. cit.*, pp. 236-237.

Table 1. Key indicators of countries in South Asia in 2007

Country	Capital	Total land area (km^2)	Total population (thousand)	Annual population growth (%)	Urbanization rate (%)	Population density (person/km^2)	GDP per capita (US$ – PPP)	Human Development Index	Human Poverty Index (%)
Afghanistan	Kabul	647,500	27,145	4.1	23.6	41.9	1,054	0.352	59.8
Bangladesh	Dhaka	147,570	158,665	1.7	25.9	1075.2	1,241	0.543	36.1
Bhutan	Thimphu	47,000	658	1.5	11.8	14	4,837	0.619	33.7
India	New Delhi	3,287,590	1,169,016	1.5	29.2	355.6	2,489	0.609	28.5
Maldives	Malé	298	306	1.8	30.5	1026.9	5,196	0.771	16.5
Nepal	Kathmandu	147,200	28,196	2.0	16.7	191.6	1,049	0.553	32.1
Pakistan	Islamabad	803,940	163,902	1.8	35.7	203.9	2,496	0.572	33.4
Sri Lanka	Colombo	65,610	19,299	0.5	15.1	294.2	4,243	0.759	16.8
SAARC		5,146,708	1,567,187	1.9	23.6	400	2,826	0.597	32.11

Source: own study on the basis of: *Statistical Yearbook for Asia and the Pacific*, UN ESCAP, Bangkok 2008, pp. 9, 18, 19, 100; *Azja Pacyfik…*; *Human Development Reports*, http://hdr.undp.org/en/statistics (20.02.2010).

Most of the region's countries have a large rural population dependent on agriculture. The GDP growth rate in 1990-2007 was on the stable level and exceeded 6%, however, there were large differences in the levels of incomes in particular countries (Figure 3). The GDP per capita (purchasing power parity US$) for Nepal is only $1049. The state with the highest GDP value is Maldives ($5196), however, it is the country with the lowest land area compared to other countries in the region with the average GDP value of $2826.

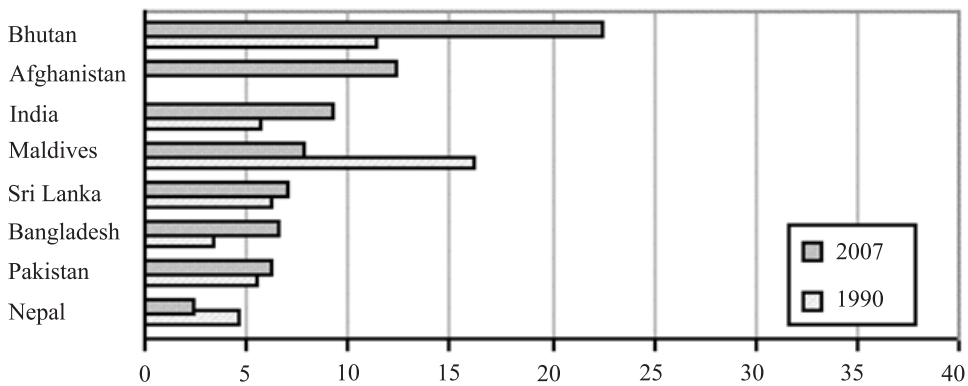

Figure 3. GDP growth rate (1990 US dollars) in countries of South Asia

Source: *Statistical Yearbook for Asia and the Pacific*, UN ESCAP, Bangkok 2007, p. 81; *Statistical Yearbook*…, 2008, p. 99.

The majority of countries in the region has achieved permanently average level of human development (HDI between 0.5 and 0.8). The countries with the highest human development index in South Asia are Maldives (0.771) and Sri Lanka (0.759), and with the lowest – Afghanistan with HDI amounting to 0.352. This country has also got the highest human poverty index – 59.8% (HPI-1). Bangladesh is after Afghanistan in the HPI ranking (36.1%). The lowest levels of poverty are measured in the best developed countries, such as Sri Lanka and Maldives, 16.5% and 16.8%, respectively.

4. Exposure of the natural disasters in the region

South Asia is the region marked by high vulnerability to natural disasters. Considering the sources of natural disasters, the highest share in the mentioned area have the hydrometeorological disasters (see Figure 4).

The analysis of the type of natural disasters reveals that the region experiences mainly floods, tropical cyclones, epidemics, earthquakes and tsunamis (see Figure 5).

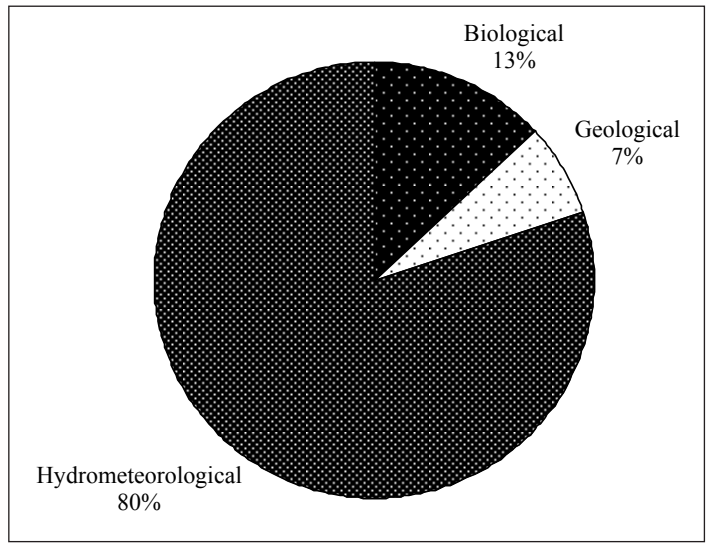

Figure 4. The occurrence of natural disasters in the region of South Asia in the years 1990-2009 according to the factor of natural disaster

Source: *Emergency Events Database*, The Office of Foreign Disaster Assistance/Centre of Research on the Epidemiology of Disasters (EM-DAT, OFDA/CRED), Université catholique de Louvain, Bruxelles, http://www.emdat.be (20.02.2010).

The sources of floods in the region of South Asia are: the river Indus, the Ganges, Brahmaputra and Meghana. Floods accompanied by mass movements and epidemics have got a negative impact on the socioeconomic development of the region.[9] Severe flooding caused high number of deaths in Pakistan and India in the periods 1991-1995 and 2001-2005.[10]

Tropical cyclones occur more frequently in the South Asia region than in any other part of the world. Bangladesh is commonly affected by wind storms and floods which affected over 30 million people and caused the high number of deaths in that country during the periods 1996-2000 and 2001-2005. April 1991 wind storm was largely responsible for the 145,400 deaths in Bangladesh in the years 1991-1995.[11]

The high number of deaths in South Asia is also caused by the extreme temperatures and the phenomena connected with them, such as: droughts, wildfires and insect infestations. Above a million people were affected by a drought in Sri

[9] M.S. Shrestha, *op. cit.*, p. 86.

[10] *India – Country Report 2006*, ADRC, New Delhi 2006, p. 1; *Pakistan – Country Report 2006*, ADRC, Islamabad 2006, p. 1; *Pakistan – Country Report 2009*, pp. 2-3; *Statistical Yearbook…*, 2007, p. 175.

[11] *Bangladesh – Country Report 2006*, ADRC, Dhaka 2006, p. 1; *Statistical Yearbook…*, 2007, p. 175.

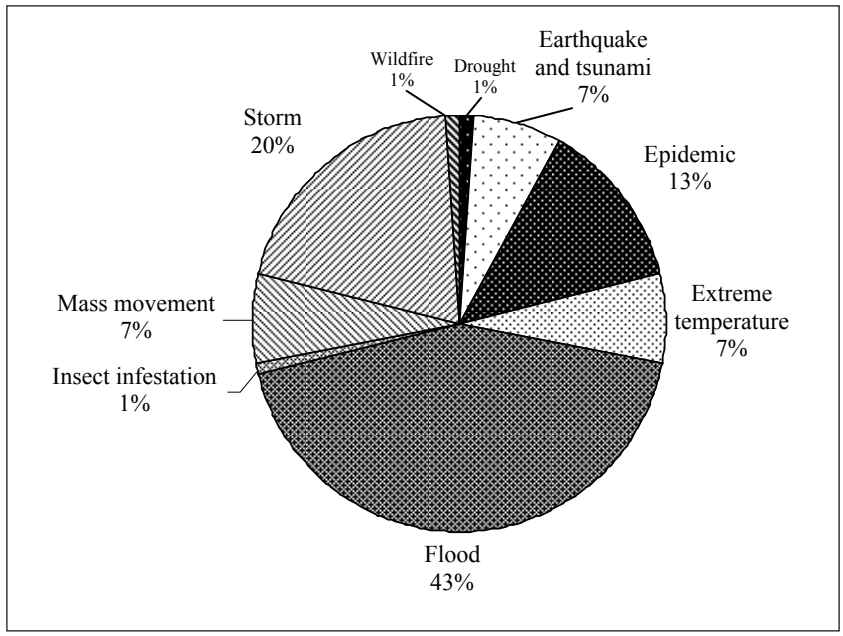

Figure 5. The occurrence of natural disasters in the region of South Asia in the years 1990-2009 according to the type of natural disaster

Source: *Emergency Events*…

Table 2. Mortality connected with natural disasters in South Asia in years 1991-2008

Country	Deaths caused by natural disasters				Natural disasters mortality ratio			
	Cumulative number over the period				Per 100,000 deaths			
	91-95	96-00	01-05	06-08	91-95	96-00	01-05	06-08
Afghanistan	2,807	8,352	5,305	1,995	157	379	211	120
Bangladesh	145,422	3,719	3,076	5,875	2,220	61	51	163
Bhutan	39	200	0	0	120	760	0	0
India	20,761	29,486	49,021	3,797	47	65	103	13
Maldives	0	0	102	0	0	0	1,120	0
Nepal	3,609	2,340	1,257	371	299	206	113	56
Pakistan	4,510	2,237	75,231	1,424	75	38	1,290	41
Sri Lanka	118	68	35,648	89	20	11	5,171	21
SAARC	177,266	46,402	169,640	13,551	367	190	1,007	51

Source: ESCAP, *Statistical Yearbook*…, 2008, p. 211.

Table 3. People affected by natural disasters in South Asia in the years 1991-2008

Country	Cumulative number over the period in thousands				Per 100,000 population			
	91-95	96-00	01-05	06-08	91-95	96-00	01-05	06-08
Afghanistan	241	2,814	548	2,423	303	2,835	473	3,078
Bangladesh	53,242	28,216	41,014	23,386	8,802	4,206	5,552	4,914
Bhutan	66	0	0	0	2,522	0	0	0
India	175,791	222,676	436.885	41,688	4,054	4,411	7,948	1,190
Maldives	0	0	12	2	0	0	838	180
Nepal	660	230	1,162	841	641	198	893	999
Pakistan	12,420	4,862	10,274	1,655	2037	706	1,346	336
Sri Lanka	785	1,077	3,,056	1,497	886	1,665	3,223	2,582
SAARC	243,205	259,875	492,951	71,492	2,406	1,752	2,534	1,660

Source: *Statistical Yearbook*…, 2008, p. 212.

Lanka on September 2001. More than 300 million people were affected by a severe drought in India during the summer 2000.[12]

Geological disasters can be very destructive in terms of casualties. Vulnerability to this kind of disasters grows as the urban poor settle in houses which are built from the cheapest materials. The disaster loss levels increase with the growing concentration of economic activity and assets, and with the concentration of critical facility and people. The December 2004 tsunami was responsible for the highest number of deaths in the recent history of the region. The October 2005 earthquake in Pakistan claimed above 70,000 lives and affected 5 million people. That single natural disaster accounted for most of the deaths that occurred in Pakistan in the years 2001-2005.[13]

5. International cooperation in the region in the field of counteracting natural disasters

In order to counteract the results of natural disasters, the countries of the South Asia region cooperate on the international level. The particular states are members of the regional international organizations, such as (Table 4):

– Asian Development Bank (ADB),
– Asian Disaster Preparedness Center (ADPC),

[12] *India – Country Report 2008*, p. 1; *Sri Lanka – Country Report 2006*, ADRC, Colombo 2006, p. 1; *Sri Lanka – Country Report 2009*, ADRC, Colombo 2009, p. 6; *Statistical Yearbook*…, 2007, p. 175.

[13] *Bhutan – Country Report 2008*, ADRC, Thimphu 2008, p. 1; *Nepal – Country Report 2006*, ADRC, Kathmandu 2006, p. 1; *Nepal – Country Report 2009*, ADRC, Kathmandu 2009, pp. 3-8; *Pakistan – Country Report 2006*, p. 1; *Statistical Yearbook*…, 2007, p. 175.

– Asian Disaster Reduction Center (ADRC),
– South Asian Association For Regional Cooperation Disaster Management Centre (SAARC).

The first of the mentioned institutions consists of all the countries of South Asia, other states of the Asia region and countries in other parts of the world. ADB has approved the Disaster and Emergency Assistance Policy (DEAP) on 1 June 2004. The DEAP is a comprehensive policy encompassing natural, technological, and environmental hazards; health emergencies; and various conflicts on the national level. The Policy establishes a series of objectives focusing on:[14]

– supporting ADB's activities by developing partnerships,
– providing rehabilitation and reconstruction assistance after a disaster took place,
– strengthening the support for reducing disaster risk in developing countries (members of ADB).

This policy is realized by accepting the Action Plan by ADB which develops an approach that will embed disaster risk management (DRM) within ADB's operational practices. A practical way for ADB to execute the Action Plan is an investment in sustainable development.

Table 4. Membership of South Asia countries in regional international organizations

Country	Capital city	ADB	ADPC	ADRC	SAARC
Afghanistan	Kabul	X			X
Bangladesh	Dhaka	X	X	X	X
Bhutan	Thimphu	X		X	X
India	New Delhi	X	X	X	X
Maldives	Malé	X			X
Nepal	Kathmandu	X	X	X	X
Pakistan	Islamabad	X	X	X	X
Sri Lanka	Colombo	X	X	X	X

Source: own study (20.02.2010) on the basis of: *ADPC Country Profiles*, http://www.adpc.net/v2007/IKM/Country%20Profiles/Default-Country.asp; *About ADRC*, http://www.adrc.asia/aboutus/index.html; *About ADB Membership*, http://www.adb.org/About/membership.asp; *SAARC Disaster Management Center – SDMC*, http://saarc-sdmc.nic.in/home.asp.

The second organization is the Asian Disaster Preparedness Center (ADPC). The members of ADPC in mentioned region are: Bangladesh, India, Nepal, Pakistan, and Sri Lanka. ADPC was created in 1999 and is a non-profit organization supporting the development of safe communities and sustainable development, through

[14] *ADB and Disaster Risk Management*, http://www.adb.org/Disaster/glance.asp (20.02.2010).

implementing programs and projects that reduce the impact of disasters upon countries and communities in Asia and the Pacific, by:[15]

– developing and enhancing sustainable institutional disaster risk management and supporting the development and implementation of government policies,
– facilitating the dissemination and exchange of disaster risk management expertise, experience and information,
– raising awareness and enhancing disaster risk management knowledge and skills.

An example of the implementation of government policy is establishing in the year 2005 a Regional Integrated Multi-Hazard Early Warning System for the Indian Ocean and Southeast Asia in cooperation with the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Meteorological Organization (WMO) and the Association of South East Asian Nations (ASEAN).[16]

The next institution is the Asian Disaster Reduction Center (ADRC) which gathers all the South Asia countries excluding Afghanistan and Maldives. ADRC was set up in year 1998. Its mission and goals are:[17]

– building safe communities,
– creating a society where sustainable development is possible,
– enhancing disaster resilience of the member countries.

Executing the mission and aims, ADRC is cooperating with global organizations such as the International Strategy for Disaster Reduction (ISDR), the Office for the Coordination of Humanitarian Affairs (OCHA) or the World Meteorological Organization.

The last of the mentioned organizations is the South Asia Association of Regional Cooperation Disaster Management Centre (SDMC) associating all the countries in the region. SDMC was created in October 2006. It provides advice policy connected with strategic learning, research, training. It also manages the system of development and exchange of information for the effective disaster risk reduction and management in South Asia.[18] To achieve its own policy SMDC is executing the following strategies:[19]

– assisting the national centers of disaster management of member countries in order to develop appropriate models of network research and training institutions,
– creating the networks of national centers of disaster management along with the concerned regional and international organizations,

---

[15] *About ADPC*, http://www.adpc.net/v2007/About%20Us/Default-Aboutus.asp (20.02.2010).

[16] *Establishing a Regional Integrated Multi-Hazard Early Warning System for the Indian Ocean and Southeast Asia*, ADPC, Bangkok 2008, p. 1.

[17] *About ADRC*.

[18] *SAARC Disaster Management Center – SDMC*, http://saarc-sdmc.nic.in/home.asp (20.02.2010).

[19] *SAARC Disaster Management Center – Networking Strategies*, http://saarc-sdmc.nic.in/sdmc_strategies.asp (20.02.2010).

– developing a network of institutions to facilitate quick acquisition, storage, retrieval and dissemination of information, data and knowledge on disaster management including links with approved real-time data providers,
– using the information and communication technologies to develop a virtual resource centre for disaster management in South Asia.

6. Conclusions

Natural disasters increase the poverty and have the negative influence on people's lives in the region of South Asia. Their occurrence causes destruction of food crops and livestock. A high number of deaths and the negative results of natural disasters, connected with poverty in countries of the region, force dislocation of households and communities and decrease the quality of life in South Asia.

The negative impact of natural disasters is higher in countries with insufficient international cooperation in executing the natural disasters policy. The occurrence of these phenomena in unprepared developing countries deprives them of an opportunity for high economic growth caused by the relocation of developing funds and assigning them to the reconstruction of the lost infrastructure crucial for the safety of the country and its citizens.

References

About ADB Membership, http://www.adb.org/About/membership.asp (20.02.2010).
About ADPC, http://www.adpc.net/v2007/About%20Us/Default-Aboutus.asp (20.02.2010).
About ADRC, http://www.adrc.asia/aboutus/index.html (20.02.2010).
ADB and Disaster Risk Management, http://www.adb.org/Disaster/glance.asp (20.02.2010).
ADPC Country Profiles, http://www.adpc.net/v2007/IKM/Country%20Profiles/Default-Country.asp (20.02.2010).
Azja Pacyfik – wszystko o Azji Południowej, http://www.azjapacyfik.pl/index_2501.php?b_2501=110 (20.02.2010).
Bangladesh – Country Report 2006, ADRC, Dhaka 2006.
Bhutan – Country Report 2008, ADRC, Thimphu 2008.
Emergency Events Database, The Office of Foreign Disaster Assistance/Centre of Research on the Epidemiology of Disasters (EM-DAT, OFDA/CRED), Université catholique de Louvain, Bruxelles, http://www.emdat.be (20.02.2010).
Establishing a Regional Integrated Multi-Hazard Early Warning System for the Indian Ocean and Southeast Asia, ADPC, Bangkok 2008.
Human Development Reports, http://hdr.undp.org/en/statistics (20.02.2010).
India – Country Report 2006, ADRC, New Delhi 2006.
India – Country Report 2008, ADRC, New Delhi 2008.
Nepal – Country Report 2006, ADRC, Kathmandu 2006.
Nepal – Country Report 2009, ADRC, Kathmandu 2009.
Pakistan – Country Report 2006, ADRC, Islamabad 2006.
Pakistan – Country Report 2009, ADRC, Islamabad 2009.

Piepiora Z., Przeciwdziałanie skutkom katastrof naturalnych w regionie Azji Południowo-Wschodniej, [in:] B. Drelich-Skulska (Ed.), *Integracja Azji Wschodniej. Mit czy rzeczywistość*, Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu nr 67, Wydawnictwo Uniwersytetu Ekonomicznego, Wrocław 2009.
SAARC Disaster Management Center – Networking Strategies, http://saarc-sdmc.nic.in/sdmc_strategies.asp (20.02.2010).
SAARC Disaster Management Center – SDMC, http://saarc-sdmc.nic.in/home.asp (20.02.2010).
Shrestha M.S., Impact of floods in South Asia, [in:] A. Khan (Ed.), *Journal of South Asia Disaster Studies*, No. 1, SAARC Disaster Management Centre, New Delhi, November 2008.
Sri Lanka – Country Report 2006, ADRC, Colombo 2006.
Sri Lanka – Country Report 2009, ADRC, Colombo 2009.
Statistical Yearbook for Asia and the Pacific, UN ESCAP, Bangkok 2007.
Statistical Yearbook for Asia and the Pacific, UN ESCAP, Bangkok 2008.
UN/ISDR Terminology on Disaster Risk Reduction, UN/ISDR, Geneva 2009.

PRZECIWDZIAŁANIE SKUTKOM KATASTROF NATURALNYCH W REGIONIE AZJI POŁUDNIOWEJ

Streszczenie: Liczba katastrof naturalnych w regionie Azji Południowej jest coraz większa. Zjawiska te często powodują śmierć wielu osób lub utratę przez nie zdrowia. Niszczenie mienia publicznego i prywatnego będące skutkiem katastrof naturalnych przyczynia się do wzrostu kosztów życia i obniżania jego jakości w badanym regionie. W obliczu tak niepokojących faktów koniecznością staje się analiza tego typu zjawisk i przeciwdziałania ich skutkom. Jest to cel niniejszego artykułu.