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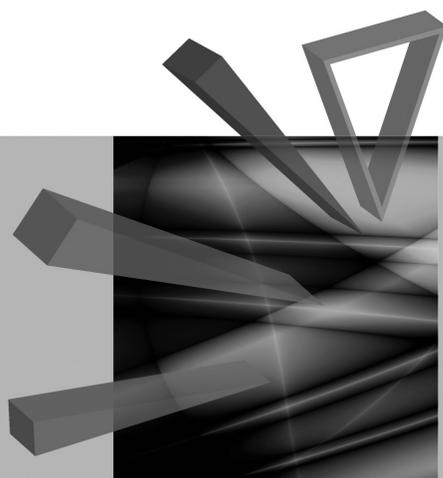
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Local Development Governance Aspects



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Zbigniew Piepiora

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THE OCCURRENCE OF NATURAL DISASTERS IN SOUTH EAST ASIA AND THE INTERNATIONAL COOPERATION IN THE FIELD OF PREVENTING THEIR NEGATIVE CONSEQUENCES

Summary: South East Asia is marked by a high vulnerability to natural disasters. The region includes the following countries: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, Viet Nam. They participate and cooperate in international institutions. The hypothesis of the article is: the participation of countries from the region of South East Asia in international organizations is a good way to prevent the negative consequences of natural disasters. This was positively verified. International cooperation is a good way to prevent the effects of these kinds of phenomena because it enables: to request disaster relief assistance from other countries by a state or states with insufficient capacity to overcome its impact, to counteract the impact on the region of a natural disaster occurring in a country or countries in cases where this kind of phenomena is expected to have a significant impact on the region.

Keywords: natural disaster, regional cooperation, South East Asia, prevention, negative consequences.

1. Introduction

The region of South East Asia includes the following countries: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, Viet Nam. These states are characterized by economic, social and political diversity. They participate and cooperate in international organizations such as: the Asian Development Bank, the Asia-Pacific Economic Cooperation, the United Nations.

They have great tourist-potential related to many historic and religious areas, archeological monuments that remained after ancient civilizations, a rich and unique cultural variety. The location of these countries, which is good for tourism, is also a problem for them because it is connected with the occurrence of natural disasters.

These kinds of phenomena appear often in the region of South East Asia. They cause economic loss, death and injuries of many people. Their effect is a deteriorating

quality of life in the region. Sometimes only international assistance can help in overcoming the effects of the natural disasters.

The hypothesis of the article is that the participation of countries from the region of South East Asia in international organizations is a good way to prevent the negative consequences of the natural disasters. This hypothesis is connected with three aims of the article:

- presenting the notion of a “natural disaster” and the effects of the chosen natural disasters in the region of South Asia;
- conducting the analysis of the occurrence of these kinds of phenomena and their influence on the environment;
- describing the international cooperation for counteracting the results of the natural disasters in this region.

2. Natural disasters – the definitions and types

A natural disaster is defined as some rapid, profound or instantaneous impact to the natural environment upon the socio-economic system [Alexander 1999, p. 4]. According to the International Disaster Database (EM-DAT), a natural disaster is when at least one of the following criteria is fulfilled: ten or more people reported killed, a hundred or more people reported affected, declaration of a state of emergency, call for international assistance [Emergency Events Database... 2012]. Natural catastrophes are triggered by natural hazards – the probability of the occurrence of a dangerous event [Abbott 2009, pp. 2–10].

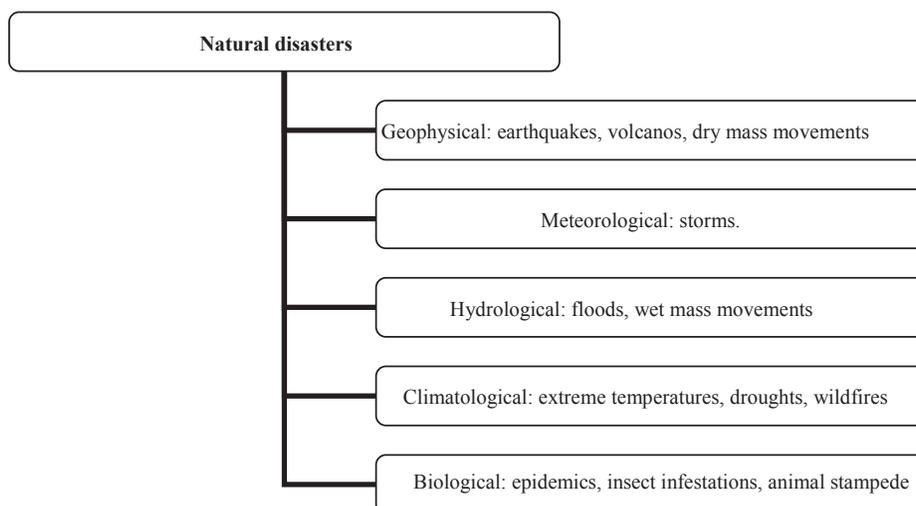


Figure 1. Classification of natural disasters according to the EM-DAT

Source: [EM-DAT, Classification 2012].

Natural disasters have a great impact on both the very rich and very poor societies. The former experience the highest property damage and the latter the highest casualty totals [United Nations... 2009, pp. 2–8]. According to the United Nations, there are biological, geological and hydrometeorological factors of these events. As we can see in Figure 1, the EM-DAT distinguishes geophysical, meteorological, hydrological, climatological and biological disasters [EM-DAT, *Classification* 2012].

Geophysical catastrophes are events originating from the earth. There are three types of these kind phenomena: earthquakes (including tsunamis), volcanos, dry mass movements.

Meteorological disasters are storms. These events result in small/short-lived to meso scale atmospheric processes, in the spectrum from minutes to days.

Hydrological catastrophes are floods and wet mass movements. These phenomena are caused by deviations in the normal water cycle or/and overflow of bodies of water caused by wind set-up.

Climatological disasters are events resulted in meso/long-lived to macro scale processes. It is in the spectrum from intra-seasonal to multi-decadal climate variability. There are three types of these kind phenomena: extreme temperatures, droughts, wildfires.

Biological catastrophes are caused by the exposure of living organisms to germs and toxic substances. There are three types of these kind of events: epidemics, insect infestations, animal stampede.

Comparing the two different classifications of natural disasters, it can be seen that the EM-DAT typology is more extensive. The group “hydrometeorological” from the UN/ISDR catalogue [Piepiora 2009a] is represented by three groups in the EM-DAT taxonomy: “meteorological”, “climatological”, “hydrological”. The UN/ISDR’s group “geological” is replicated by the EM-DAT’s group “geophysical”.

3. The profile of the region of South East Asia

As we can see in Figure 2, South East Asia is the commonly accepted name for the group of island and peninsulas which lie east of India and west of China. Except for North Vietnam and the mountain regions, the annual temperature range in South East Asia is 27–36° C. Humid and warm climatic conditions have given rise to lush tropical rain forests teeming with a wide variety of plant and animal life [*Asia’s Perfect 10 Paradise. South East Asia* 2012].

The region of South East Asia is remarkable for diverse areas, geography, natural resources, cultural legacy, colonial experience, system of government, stage of development and population. As we can see in Table 1, the region covers approximately 4.5 million km² and has over 0.5 billion inhabitants. It houses one of the most populous countries in the world, Indonesia, with a population of approximately 240 million inhabitants, as well as one of the smallest countries on Earth – Brunei Darussalam, with a population of only 400 000 in 2009. The annual

population growth rate is 1.5%, with the highest rate in Singapore amounting to 2.8%. A remarkable increase of population has caused an increase of the population density, which is 7 163 persons per 1 km² in Singapore, but just 133 person/km² in the entire region. The increase of population density poses a threat because land resources are being gradually limited. Brunei Darussalam and Malaysia have the highest urbanization rates (above 70%). The growing urban development puts pressure on the urban infrastructure, such as the concentration of poor cities. Apart from the existing physical and environmental factors in South East Asia, these poor social and economic conditions entail the increase of vulnerability to damage caused by natural disasters [Bildan 2003, p. 3].



Figure 2. South East Asia

Source: [Asia's Perfect 10 Paradise. ASEAN Map... 2012].

The region's economies are diversified – from large rural populations dependent on agriculture in Cambodia, Lao PDR, Myanmar and Timor Leste, to the developed, modern economy in Singapore. The GDP growth rate in 1990–2007 was stable and exceeded 4%, however there were large differences in the levels of incomes in particular countries [Statistical Yearbook... 2011, pp. 105–2011]. The GDP *per capita* (purchasing power parity USD 2009) for Timor Leste is only 848 USD. The state with the highest GDP value is the Maldives (52 872 USD); however, it is the country with the lowest land area compared to other countries in the region with an average GDP value of 11 497 USD.

Table 1. Key indicators of countries in South East Asia in 2009–2011

Country	Capital	Total land area	Total population (in '000) – 2010	Annual population growth – 2010 (%)	Urbanization rate (%) – 2010	Population density (persons per km ²) – 2010	GDP per capita (USD 2009 - PPP)	Human Development Index – 2011	Multi-Dimensional Poverty Index – 2011 (%)
Brunei Darussalam	Bandar Seri Begawan	5 765	399	1.8	75.7	69	36 177	0.838	not available
Cambodia	Phnom Penh	181 035	14 138	1.1	20.1	78	1 788	0.523	0.251
Indonesia	Jakarta	1 860 360	239 871	1	44.3	128	4 371	0.617	0.095
Lao PDR	Vientiane	236 800	6 201	1.5	33.2	26	2 250	0.524	0.267
Malaysia	Kuala Lumpur	330 252	28 401	1.6	72.2	86	12 353	0.761	not available
Myanmar	Naypyidaw	676 577	47 963	0.8	33.6	71	1 138	0.483	0.154
Philippines	Manila	300 000	93 261	1.7	48.9	311	3 592	0.644	0.064
Singapore	Singapur	710	5 086	2.8	100	7 163	52 872	0.866	not available
Thailand	Bangkok	513 120	69 122	0.6	34	135	7 944	0.682	0.006
Timor-Leste	Dili	14874	1 124	2.2	28.1	76	858	0.495	0.360
Viet Nam	Hanoi	331 212	87 848	1.1	30.4	265	3 124	0.593	0.084
ASEAN + Timor-Leste	Jakarta	4 450 705	593 414	1.5	47,3	133	11 497	0.638	0.142

Source: own elaboration on the basis of: [Statistical Yearbook... 2011, pp. 147–153; *The Official Website...* 2012; *Central Intelligence Agency...* 2012; *International Human Development Indicators. Country Profiles ...* 2012; *Human Development Reports* 2012; *Historical Inflation Rate* 2012].

The majority of countries in the region has achieved permanently a medium and high level of human development (HDI between 0.631 and 0.741) [*International Human Development Indicators. Human...* 2012]. The countries with the highest human development index in South East Asia are Singapore (0.866), Brunei Darussalam (0.838) and Malaysia (0.761), and the lowest – Myanmar with HDI amounting to 0.483. Timor-Leste has the highest multidimensional poverty index (MPI) – 0.360 [*International Human Development Indicators. Multidimensional...* 2012]. The MPIs for Brunei Darussalam, Malaysia and Singapore are not available.

4. Exposure to natural disasters in the region

South East Asia is a region marked by high vulnerability to natural disasters. As we can see in Figure 3, the analysis of the type of natural disasters reveals that the region experiences mainly floods, storms, earthquakes and seismic activity, e.g. in 2000, in Lao PDR 15 persons were killed and 450 000 people were affected by flooding [Director of Department... 2008, pp. 1–6]. In January 2011, in Johor, Malaysia, 6 persons were killed and 116 660 people were affected by flood [Director of Crisis... 2011, pp. 1–15].

In Cambodia, in 2000, 3 448 053 people were affected by storms. The estimated damage amounted 100 million USD. Two years later 650 000 people were affected by drought, the estimated damage amounted to 38 million USD [The National Committee... 2008, pp. 1–5]. In 2004, in Myanmar 236 persons were killed and 25 000 people were affected by tropical cyclones, the estimated damage amounted to 688 000 USD [General Director 2006, pp. 1–3]. In 2004, in Viet Nam 23 people were killed by land mass movement, and 21 were killed and 43 affected by epidemics [Director of Dept... 2006, pp. 1–3].

Considering the sources of natural disasters (the United Nations classification), hydro-meteorological disasters have the highest share in the mentioned area. According to the EM-DAT, hydrological catastrophes mostly occurred in South East Asia.

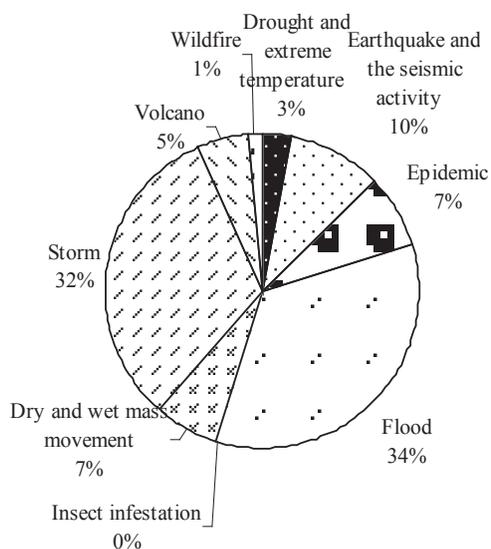


Figure 3. The occurrence of natural disasters in the region of South East Asia in 1900–2011 according to the type of natural disaster

Source: [EM-DAT... 2012].

The occurrence of natural disasters in the region of South East Asia in 1900–2011 according to country is presented in Figure 4. As we can see, the natural disasters mostly occurred in the Philippines and Indonesia in the examined period, e.g. in 2005, in Indonesia 1 659 persons were killed and 267 677 people were affected by the tsunami [National Coordinating Board... 2006, pp. 1–6]. The safest states were Singapore and Timor-Leste.

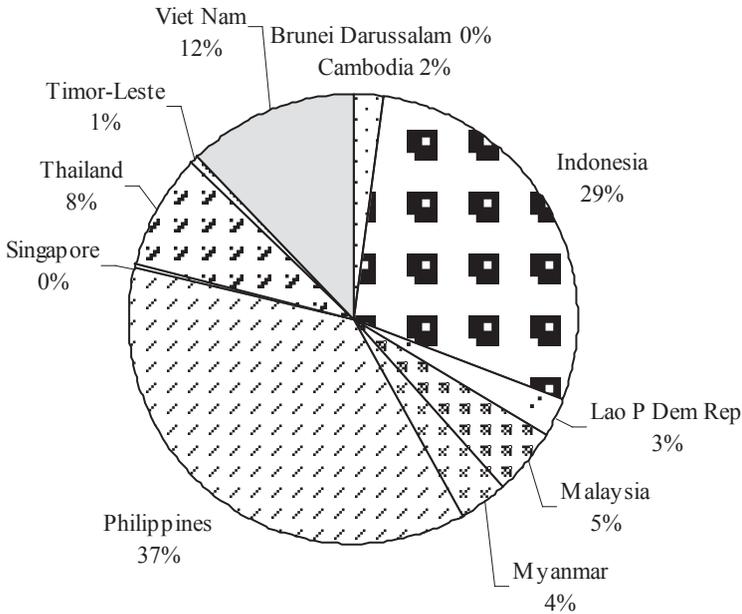


Figure 4. The occurrence of natural disasters in the region of South East Asia in 1900–2011 according to country

Source: [EM-DAT... 2012].

The natural disasters that occurred in South East Asia in the period of 1900–2011, by natural disaster type, are presented in Table 2. As we can see, most people were killed by earthquakes and storms – the total number exceeded 400 thousand. Most of the people were affected by storms and floods – nearly 300 million. The highest estimated damage costs were caused by floods. The losses amounted to over 54 billion USD at current prices.

The natural disasters that occurred in South East Asia in 1900–2011 by country are presented in Table 3. As we can see, most people were killed in Indonesia – the total number exceeded 240 thousand.

Table 2. Natural disasters that occurred in South East Asia in 1900–2011, by natural disaster type

Disaster Type	Number	Deaths	People affected	Estimated damage costs (000' USD)
Drought	42	9 337	58 255 029	1 437 073
Earthquake (seismic activity)	143	217 658	11 381 928	14 089 101
Epidemic	106	8 854	1 380 708	0
Flood	494	21 631	127 893 196	54 600 270
Insect infestation	3	0	200	925
Mass movement dry	5	564	701	1 000
Mass movement wet	89	5 133	939 338	156 326
Storm	459	206 758	171 975 365	17 048 785
Volcano	77	21 267	2 910 933	576 351
Wildfire	19	310	3 116 366	9 644 000
Total	1 437	491 512	377 853 764	97 553 831

Source: [EM-DAT... 2012].

Table 3. The number of disasters that occurred in South East Asia in 1900-2011, by country

Country	Number	Deaths	People affected	Estimated damage costs (USD)
Brunei Darussalam	1	0	0	2 000
Cambodia	32	2 214	18 319 666	1 057 110
Indonesia	412	240 943	27 961 241	24 017 308
Lao P Dem Rep	38	1 340	9 621 468	446 559
Malaysia	67	1 397	1 355 405	1 931 100
Myanmar	51	146 065	6 661 848	4 730 643
Philippines	529	58 927	147 551 181	9 543 112
Singapore	3	36	2 238	0
Thailand	119	14 682	86 031 995	47 136 747
Timor-Leste	8	27	13 571	0
Viet Nam	177	25 881	80 335 151	8 689 252
Total	1 437	491 512	377 853 764	97 553 831

Source: [EM-DAT... 2012].

Most people were affected in the Philippines – nearly 150 million. Only in the period of 1970–2009, the annual average disaster direct damage figure ranged from 100 million to 300 million USD, and was further increased by the indirect and secondary impact of disasters. The cost of direct damage is equivalent to 5% of the Philippines' GNP. An average of 1 002 casualties annually, and flooding was the topmost disaster in the period 2004–2005. In the last quarter of 2009, the storms

Ondoy (Ketsana), Pepeng (Pharma) and Santi, killed 956 persons and severely affected 9.3 million people. The total estimated damage and losses incurred were 4.38 billion USD which is 2.7% of GDP [Ramos 2011, pp. 1–34].

The highest estimated damage costs were suffered in Thailand. The losses amounted to over 47 billion USD, e.g. in 2010, 266 persons were killed and 13 485 9634 people were affected by flooding. The estimated damage exceeded 0.5 billion USD [Sangaunpong 2008, pp. 1–23]. In total, in the region of South East Asia in the examined period there were registered in EM-DAT 1437 natural disasters which killed 491 512 persons, affected 377 853 764 people and caused 97 553 831 USD estimated damage costs at current prices.

5. International cooperation in the region in the field of preventing negative consequences of natural disasters

In order to prevent the effects of natural disasters, the countries of the South East Asia region cooperate at international level. As we can see in Table 4, these states are members of the regional international organizations, such as [Piepiora 2009b, p. 241]:

- Asian Development Bank (ADB);
- Asian Disaster Preparedness Center (ADPC);
- Asian Disaster Reduction Center (ADRC);
- Association of Southeast Asian Nations (ASEAN);
- Asia-Pacific Economic Cooperation (APEC);
- United Nations (UN).

The first of the aforementioned institutions consists of all the countries of South East Asia, other states of Asia and countries in other parts of the world. ADB 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: providing rehabilitation and reconstruction assistance after a disaster took place; supporting ADB's activities by developing partnerships; strengthening the support for reducing disaster risk in developing countries (members of ADB) [*Asian Development Bank. Policies...* 2012]. 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 [Piepiora 2010b, p. 173]. This is a good way to prevent the negative consequences of natural disasters.

The second organization is the Asian Disaster Preparedness Center (ADPC). The members of ADPC in the mentioned region are: Cambodia, Indonesia, Lao PDR, the Philippines, Thailand, Viet Nam. ADPC was created in 1999 and is a non-profit

organization. It supports the development of safe communities and sustainable development. It is realized through implementing programs and projects that reduce the impact of disasters upon countries and communities in Asia and the Pacific, by: raising awareness and enhancing disaster risk management knowledge and skills; facilitating the dissemination and exchange of disaster risk management expertise, experience and information; developing and enhancing sustainable institutional disaster risk management and supporting the development and implementation of government policies [ADPC Profile 2012; Piepiora 2010c, p. 275]. The evolution of sustainable development is similar to the idea of ADB.

An example of the implementation of governments' policies is the establishing in 2005 of the Regional Integrated Multi-Hazard Early Warning System for the Indian Ocean and Southeast Asia, in cooperation with the United Nations and the Association of South East Asian Nations [Bildan 2006, p. 1–3].

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

Country	Capital	Asian Development Bank (ADB)	Asian Disaster Preparedness Center (ADPC)	Asian Disaster Reduction Center (ADRC)	Association of Southeast Asian Nations (ASEAN)	Asia-Pacific Economic Cooperation (APEC)	United Nations (UN)
Brunei Darussalam	Bandar Seri Begawan	X			X	X	X
Cambodia	Phnom Penh	X	X	X	X		X
Indonesia	Jakarta	X	X	X	X	X	X
Lao PDR	Vientiane	X	X	X	X		X
Malaysia	Kuala Lumpur	X		X	X	X	X
Myanmar	Naypyidaw	X		X	X		X
Philippines	Manila	X	X	X	X	X	X
Singapore	Singapur	X		X	X	X	X
Thailand	Bangkok	X	X	X	X	X	X
Timor-Leste	Dili	X					X
Viet Nam	Hanoi	X	X	X	X	X	X

Source: [Asian Development Bank. Members 2012; Asian Disaster Preparedness... 2012; Asian Disaster Reduction... 2012; Association of Southeast Asia... 2012; Asia-Pacific Economic... 2012; Member States... 2012].

The next institution is the Asian Disaster Reduction Center (ADRC) which includes all the South Asia countries excluding Brunei Darussalam and Timor-Leste. ADRC was set up in 1998, its mission and goals are: creating a society where sustainable development is possible, building safe communities, enhancing disaster resilience of the member countries [Piepiora 2010a, p. 112]. Executing its mission

and aims, ADRC cooperates with the United Nations [*Asian Disaster Reduction...* 2012]. The ADRC functions are similar to those of the ADPC.

The fourth of the aforementioned institutions is the Association of Southeast Asian Nations (ASEAN) which includes all the South Asia countries, except for Timor-Leste. It was established on 8th August 1967. In 2003 ASEAN established the ASEAN Committee on Disaster Management (ACDM). ACDM consists of heads of national agencies responsible for disaster management of ASEAN Member Countries. ACDM assumes overall responsibility for coordinating and implementing the regional activities. The ACDM members met for the first time in December 2003. One of its activities was, as mentioned earlier, establishing in 2005 a Regional Integrated Multi-Hazard Early Warning System for the Indian Ocean and Southeast Asia [Association of Southeast... 2012].

The next organization is Asia-Pacific Economic Cooperation (APEC) [Piepiora 2011, pp. 96–97]. The members of APEC in the above mentioned region are: Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore, Thailand, Viet Nam. APEC has established the APEC's Emergency Preparedness Working Group (EPWG). EPWG plays a constructive role in enabling the region to better prepare for, and respond to, emergencies and disasters by helping to reduce the risk of disasters and building business and community resilience. By sharing expertise and collaborating on emergency preparedness issues, the APEC members strengthen their capacity to mitigate emergencies and disasters. APEC can also complement the efforts of other organizations to prevent the economic impact on the region of natural disasters occurring in member economies, as well as non-member economies in cases where those catastrophes are anticipated to have a significant impact on the region [*Asia-Pacific Economic...* 2012].

The last of the mentioned organizations is the United Nations (UN). It consists of all the countries of South East Asia, other states of the Asia region and countries in other parts of the world. To prevent the negative consequences of natural disasters in a global perspective, the United Nations has established a variety of agencies and international organizations and initiatives, such as the International Strategy for Disaster Reduction (UN/ISDR), the Office for the Coordination of Humanitarian Affairs (OCHA), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Meteorological Organization (WMO), the World Health Organization Regional Office for the Western Pacific (WHO/WPRO) and the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). These institutions often cooperate with the earlier mentioned, regional, international intuitions [*United Nations. UN At Glance* 2012] which is a good way to prevent the negative consequences of natural disasters.

6. Conclusion

The hypothesis of the article was that the participation of countries from the region of South East Asia in the international organizations is a good way to prevent the negative consequences of natural disasters. This was positively verified.

Natural disasters are events which cause economic loss, death and injuries of many people. South East Asia is a region marked by the high vulnerability to these kinds of phenomena. The examined region experiences mainly geological and hydrometeorological (geophysical, hydrological and meteorological – according to the EM-DAT) disasters such as floods, storms, earthquakes and seismic activity.

In total, in the region of South East Asia in 1900–2011 there were registered in EM-DAT 1437 natural disasters which killed 491 512 persons and affected 377 853 764 people. The estimated damage costs at current prices amounted to 97 553 831 USD.

The countries of the region cooperate in preventing the negative consequences of the natural catastrophes. The cooperation manifests itself in their participation in international, global and regional institutions such as: Asian Development Bank (ADB), Asian Disaster Preparedness Center (ADPC), Asian Disaster Reduction Center (ADRC), Association of Southeast Asian Nations (ASEAN), Asia-Pacific Economic Cooperation (APEC), the United Nations (UN). International cooperation is a good way to prevent the negative consequences of natural disasters because it enables:

- to request disaster relief assistance from other countries by a state or states with insufficient capacity to overcome the natural catastrophe's impact,
- to counteract the impact on the region of a natural disaster occurring in a country or countries in cases where this kind of phenomena is anticipated to have a significant impact on the region;
- to develop the region in a sustainable way.

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WYSTĘPOWANIE KATASTROF NATURALNYCH W AZJI POŁUDNIOWO-WSCHODNIEJ I MIĘDZYNARODOWA WSPÓŁPRACA W ZAKRESIE ZAPOBIEGANIA ICH NEGATYWNYM KONSEKWENCJOM

Streszczenie: Azja Południowo-Wschodnia charakteryzuje się wysoką podatnością na szkody spowodowane przez katastrofy naturalne. Region składa się z następujących krajów: Brunei Darussalam, Kambodża, Indonezja, Demokratyczna Republika Laosu, Malezja, Mjanma (Birma), Filipiny, Singapur, Tajlandia, Timor Wschodni. Państwa te partycypują i są członkami międzynarodowych instytucji. Hipoteza artykułu brzmi: uczestnictwo krajów regionu Azji Południowo-Wschodniej w organizacjach międzynarodowych jest dobrym sposobem zapobiegania negatywnym konsekwencjom katastrof naturalnych. Została ona zweryfikowana pozytywnie. Międzynarodowa współpraca jest dobrym sposobem zapobiegania skutkom tego typu zdarzeń, gdyż umożliwia: uzyskanie pomocy w zmniejszaniu skutków wystąpienia katastrofy od innych krajów przez państwo lub państwa z niewystarczającą zdolnością do przewyciężenia jej skutków, przeciwdziałanie oddziaływaniu katastrofy naturalnej na region w kraju lub w krajach, w którym/których wystąpiła w sytuacji, gdy przewiduje się, że zjawiska tego typu mogą mieć znaczące oddziaływanie na region.

Słowa kluczowe: katastrofa naturalna, współpraca regionalna, Azja Południowo-Wschodnia, zapobieganie, negatywne konsekwencje.