



Towards a sustainable health policy in the anthropocene

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This essay¹ links analyses on environmental deterioration and health efforts in a wider socio-economic and cultural context. It reviews effects of the neoliberal economic model

(based on wasteful fossil energy, social inequality, consumerism, fashion, and growth concentrated in small elites) on the environment and on human well-being. If 'business as usual strategies' prevail (OSWALD & BRAUCH 2011) the planet and world society may face, during this century, the societal impacts of 'dangerous climate change'

(SCHELLNHUBER ET AL. 2006). While this model has benefited a minority of the global population, it has and will affect regions, cultures, and social classes differently with negative impacts on international security (UN-SG 2009), thus posing new equity issues. Southern countries have usually been the main victims, suffering most from climate-induced physical (temperature and sea-level rise, precipitation change, increase in the number and intensity of natural hazards such as drought, heat waves, storms and floods) and societal impacts (famine, food protests, migration). Further, the coexistence of both traditional ill-

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nesses and modern ones, related to the pollution of water, air and soil (intoxication, respiratory, kidney and skin problems) and the transformation of diet (diabetes, cardiovascular illnesses), have exacerbate their vulnerability.

At the conceptual level, this paper explores the complex interaction between anthropogenic drivers, the impacts of and the policy responses to climate change, their interrelationship with the dominant productive system of globalisation and the effects on human health. It also investigates a preventive concept of sustainable health at affordable costs, based on the restoration of environmental services and the integration of traditional and modern knowledge. In future scenarios with severe climate change impacts, humankind, international society and the business community, as well as the community of states and international organisations will have to face many challenges to their well-being and survival, which may be more severe than any security threat that states have experienced in the past (BRAUCH ET AL. 2009, 2011).

These new and non-military security dangers in the Anthropocene¹ have already resulted in a new 'soft' security agenda that fundamentally differs from the hard security policies of the past century. To deal with these new security risks and threats, a new policy of global health should complement the prevailing 'state-centred' approach to health security based on a widened understanding of security that is 'people-centred' (ANNAN 2005)

Such a human security approach to health (CHEN ET AL. 2003, 2003A, 2003B, 2003C) may focus on all four pillars of a widened security concept understood as 'freedom from fear' (HUMAN SECURITY REPORT 2005); 'freedom from want' (OGATA

& SEN 2003; BRAUCH 2005); freedom to live with dignity, justice and equity (ANNAN 2005; SEN 1995); and 'freedom from hazard impacts' (BOGARDI & BRAUCH 2005; BRAUCH 2005A; OSWALD 2008). Health security is therefore intimately related to a sustainable management of the environment (BOOKCHIN 1988). Thus, as a holistic policy concept it combines four other key concepts: sustainability, development, security and health. Such an integrated strategy can offer both a conceptual framework and guidelines for translating anticipatory learning into proactive policies and measures – a strategy of sustainable development combined with a vision of sustainable health. In synthesis, this represents the vision or policy perspective of a combined human, gender and environmental security concept or of a HUGE² policy approach to security.

The paper first explores the evolution of the term 'health security' by asking which strategies, policies, and measures of sustainable development and preventive health behaviour can contribute to a healthy society and environment. Then it poses the question how the environment is related to health and how environmental strategies, policies, and measures can influence values, change behaviour, and pave new avenues for an integrated health prevention and sustainable environment. This proposal implies a negotiated model of development that decreases pollution, environmental threats and social inequality and

vulnerability. Later, it analyses the effects of climate change (CC) and its impact on different epidemiological patterns and the upcoming of new ones. Existing social vulnerability and vulnerability assessment are crucial to understand the often negative outcomes. Finally, it discusses both urban air pollution and water-born and vector illnesses in Mexico. In the conclusions, the essay proposes an integral sustainable health approach to deal with the new threats and challenges posed by CC and social vulnerability. This may reduce social, cultural, and economic gaps without affecting the fragile equilibrium of the Earth and its threatened ecosystems.

Health security: a new concept with an integral understanding of health policy

LEANING (2009) has proposed a wider and people-centred understanding of health security, where underlying globalisation, demographic and environmental changes and particularly climate change effects, the growing disparity between rich and poor nations and people, as well as migration, are integrated. Leaning's understanding of health security goes beyond the narrow approach of military security³ and links it to the fulfilment of the Millennium Development Goals (MDGs) and to the human security approach

1 The term Anthropocene was coined by CRUTZEN (2002) and CRUTZEN & STOERMER (2000) and describes the current period of Earth history since the Industrial Revolution when human activities have interfered with the Earth system.

2 The HUGE concept (OSWALD 2007, 2009) is based on a sustainable culture of peace, but goes a step further by including wider and deeper security concerns. This concept complements the formal policy approach on human security by UNDP (1994) by extending the traditional scope of security (horizontal widening) from political and military to economic, social and environmental security. In relation to the actors it includes a top-down and also a bottom-up self-reliant perspective. By vertical deepening the referent objects shift from 'state' to 'human' and 'gender' security as well as from 'national' to 'regional', 'global' but also 'societal' and 'local' security. Since the 1970s a sectorialization of security with regard to energy, food, health, water and livelihood security was used by governments, international and societal organizations (BRAUCH ET AL. 2009).

3 After the Cold War the prevailing narrow concept of military and political security threats was widened and deepened (BUZAN ET AL. 1998) to WOLFERS (1962) classic realist definition of security. Due to an absence of objective threats and subjective fears, social constructivists have added an intersubjective understanding where security refers to 'what actor's make of it' by referring to their policy declarations or 'speech acts'. These are central for Waever's theory of 'securitization' (WAEVER 1995, 2000, 2008) by moving an issue of 'utmost importance' from the political to the security realm, thus legitimising 'extraordinary measures'. This process of securitization has only succeeded when the audience (population) has supported it. Thus, the recent securitization of the AH1N1 influenza by WHO and many governments has largely failed, as in many countries both physicians and the people remained unconvinced of the need for a massive vaccination.

(UNDP 1994) that has been adapted to changing conditions posed by climate change, population growth, urbanization and environmental deterioration (BRAUCH ET AL. 2008, 2009).

On the other hand, the World Health Organization (WHO 2002A, 2003; WHO/FAO 2003A) has promoted a narrow and state-centred health security concept that was also influenced by the events of September 11, 2001 and by the potential threats of biological weapons and terrorism (RODIER & KINDHAUSER 2009). With SARS and the AH1N1 influenza, the outbreaks of pandemics were also integrated into its health security agenda and goals. The declaration by WHO of a global pandemic emergency has had severe effects on the economy and on jobs in some affected countries.⁴ This state-centred understanding of health security included recommendations to combat the pandemic with a global vaccination and severe hygienic practices to prevent a global spread of the pandemic, as well as developing specific drugs to combat the illness. Policymakers in industrialised countries emphasised the protection of their population against external threats, unknown epidemics and terrorism. This narrow understanding of health security was globally promoted by WHO (2003) at the request of and in close consultation with many industrialised countries. Poor countries were confronted with new political pressures to buy drugs and vaccines to fight against these epidemics, while other more urgent health issues could not be funded due to limited financial resources.

Therefore, in several developing countries the dominant state-centred understanding of health security by WHO, coupled with fears of hidden



national security agendas of powerful countries, have contributed to a breakdown of mechanisms for global cooperation such as the International Health Regulations (WILLIAM ALDIS 2008). Nevertheless, globally shared epidemiological data have been interchanged, but several southern countries complied with this requirement often reluctantly.

WHO's narrow definition and only partial elaboration of its health security concept (WHO 2002, 2002B) with regard to public health requirements of developing countries have been criticised (CHEN ET AL. 2003, 2003C). In its understanding of health security, both community-based primary healthcare but also environmental factors have not been sufficiently integrated. Thus, health workers and policymakers in developing countries, threatened by traditional and modern illnesses and increasingly affected by climate change related health problems, have insisted on a broader approach to the health security concept. In a case study on health security in North Vietnam and Bangladesh, FISCHER & SALEHIN (2009) proposed a wider understanding of hu-



man and health security that includes infectious diseases, impoverishment, economic crises, the megacity-slum development, post-conflict and public violence that have created syndromes of illness, injury, disability and death, where the unsafe environment and the lack of access to healthcare pose the crucial health security problems for most poor countries.

Health security and environmental services

Environmental services provide the basic provision for human well-being and livelihood, such as clean air,

⁴ The Mexican government estimated that the country lost about 5% of its GDP due to the outbreak of AH1N1 in April 2009 and in March 2010, the tourist industry reported that the jobs in this sector had dropped below the level prior to the crisis, because after almost a year this sector has still been affected.

freshwater, wood fuel, fibres, construction materials and food products. The environment further offers supporting services needed in the production chain, for survival and for all other ecosystem services, such as nutrient cycling (nitrogen, sulfur, oxygen, carbon cycles). In addition, ecosystems offer other benefits resulting from the regulation of both natural and anthropogenic processes. Crucial in this relation are proactive climate policies, natural water purification, protection from the stratospheric ozone, mitigation against hurricanes and surge waves (e.g. through mangroves), the control of landslides by forests cover, but also the separation of human waste and toxics and their integration into the natural cycle.

Finally, there are immaterial, cultural and belief processes related to environmental services and the cultural heritage. These processes have facilitated the development of cultural services (food culture, religious beliefs, joy, beauty, understanding, relaxation, etc.) as essential parts of the development of human civilizations. This complex interrelationship of providing, supporting, regulating and of cultural services from the environment has offered human beings the material and imminent minimum needed for their survival. The surplus contributed to the consolidation of urban areas and to the development of civilizations that increased the potential for freedom of choice, the consolidation of social relations and the division of labour. These processes support the new understanding of widened and deepened security concerns, where the values at risk (life quality, culture and identity) and the sources of threats (by other countries and non-state actors, such as terrorist or organised crime) have shifted from the protection of national sovereignty (of the territory, the people and the system of rule) to the fulfilment of basic human needs (water, food, health), the protection

(often from their own government) and empowerment of the people by supporting local resilience-building.

Nevertheless, the human pressure on nature related to demographic growth, consumerist behaviour of global capitalism, urbanization and industrial revolution with intensive use of fossil fuel have altered traditional processes of providing, supporting, regulating and of culture. These processes were responsible for the emergence of new threats to security and to human health through different mechanisms.

Environmental security was threatened (DALBY ET AL. 2009; OSWALD ET AL. 2009) by direct effects, such as forest clearance and land cover change due to urbanization and agricultural processes; loss of wetland related to drainage systems; destruction of biodiversity by overexploitation and pollution; stratospheric ozone depletion with CFC gases, and climate change due to intensive fossil energy use, all of which have created new and dangerous health impacts. New epidemics, intoxications, floods, heat waves, water shortage, increased ultraviolet radiation, exposure to pollutants, water-borne and vector illnesses are some of the direct threats to human health security.

There also exist ecosystem-mediated health impacts with risks of altered infectious diseases. The reduction of yield productivity and food scarcity (malnutrition, stunting), the loss of traditional medicines, stress and the increase of patterns of mental illness, but also the destruction of aesthetics and cultural diversity in languages and behaviour are undermining health security. A third impact on health security due to climate change is of an indirect nature. It relates to people who have been displaced with livelihood losses, to people displaced by modernisation processes or due to climate change impacts (sea level rise, floods, air pollution, toxic accidents,

etc.). The latter could also include the inhumane conditions of slum dwellers ('freedom from want'); refugees fleeing conflicts and war and lack of public security ('freedom from fear'); but also the inappropriate mitigation and adaptation mechanisms to climate change ('freedom from hazard impact'), and the reiterative economic and financial crises affecting the prospects for survival of large sectors of the population, simultaneously producing a concentration of economic wealth controlled by a small élite. While global environmental change and globalisation processes have increased global life expectancy, both have created new threats and risks for health security, often related to the modernisation process and its negative outcomes for the environment and humankind.

Impacts of climate change and of the globalisation processes for health security in Mexico

Mexico is a threshold country seriously exposed to climate change and deeply transformed by urbanization and globalisation. In 2010, 72 per cent of its population is urban and since the 1950s, Mexico City has been one of the biggest third world megacities with large slums, a highly polarised society and limited economic growth during the past two decades. The country is not only threatened by urbanization and land use changes, but also by an inadequate management of toxics. The lack of integrated land planning has also affected the high level of cultural diversity, where 62 indigenous languages are still spoken.

The profound changes of the landscape have affected water security and air quality, both distressing human health and ecosystem services. Almost all 837 hydrographic basins and 42 main rivers are polluted and together with the overexploitation and contamination of 104 of the 653 existing aqui-

Developing countries high mortality (%)	Developing countries low mortality (%)	Developed countries (%)
Underweight	14.9	Alcohol 6.2 Tobacco 12.2
Unsafe sex	10.2	Blood pressure 5.0
Unsafe water, sanitation & hygiene	5.5	Tobacco 4.0 Alcohol 9.2
Indoor smoke from solid fuel	3.6	Underweight 3.1 Cholesterol 7.6
Zinc deficiency	3.2	Overweight 2.4 Overweight 7.4
Iron deficiency	3.1	Cholesterol 2.1 Low fruit and vegetable intake 3.9
Vitamin A deficiency	3.0	Low fruit and vegetable intake 1.9 Physical activity 3.3
Blood pressure	2.5	Indoor smoke from solid fuel 1.9 Illicit drugs 1.8
Tobacco	2.0	Iron deficiency 1.8 Unsafe sex 0.8
Cholesterol	1.9	Unsafe water, sanitation & hygiene 1.8 Iron deficiency 0.7

TABLE 1: Risk factors to health security related to different socio-economic conditions of countries.

Source: WHO (2002)

fers, the negative impacts that exist are water-born illnesses (e.g. cholera, salmonella, amoebas and diarrhoea), vector diseases (dengue, malaria) and declining soil productivity and falling agricultural outputs.

The overexploitation of aquifers has dissolved minerals in the groundwater and more than 400,000 people are now affected by arsenic pollution in their drinking water (GENERAL DIRECTION OF EPIDEMIOLOGY 2008). Small children in Aguascalientes, in the central high plateau of Mexico, have chronic kidney problems and require kidney transplantations and expensive dialyses treatment (ARREOLA ET AL. 2011). Diarrhoea is a common health problem, and although treatment plants and safe water have improved the health conditions of urban dwellers, they have, mostly, not yet reached the rural population. The incidence of gastro-intestinal deaths of children under five years dropped from 212.3/100,000 in 1984 to 60.4/100,000 in 2003. Nevertheless, the ongoing climate change threats related to more frequent and stronger hurricanes have increased the threats of malaria that nearly tripled between 2000 and 2005 from 2.77 to 7.27 cases for 100,000 people/year. It is estimated that 30 per cent of the Mexican population is at risk. Finally, dengue fever increased from 2004 to 2008 in Mexico by 800 per cent, with 80 per cent of

these cases occurring in the South-Southeast (GENERAL DIRECTION OF EPIDEMIOLOGY 1984-2008).

Urbanization and industrialisation has increased air pollution and people living in the megacities, especially children near highways, are threatened by chronic bronchitis and asthma. The yearly costs for hospitalisation and the death toll in Mexico City due to air pollution were estimated at about 11.1 billion dollars. Further, hospitalisation due to air-born and cardio-vascular illnesses have cost several hundred million dollars. These figures do not include the loss of work days and the impact on the economy of families who have to pay for the healthcare of affected family members. The chronic infection of lungs and pulmonary atrophy in children in the slum regions of Netzahualcoyotl, Chalco and Iztapalapa are not reflected in these data sets. Particularly at risk are bus drivers working in the public transportation system, where according to an epidemiological study in the state of Morelos, all of them showed alterations in their upper respiration tract.

These epidemiological data indicate that not only in Mexico, but worldwide manifold vulnerabilities result from globalisation and climate change. These environment related and specific human security threats must be addressed through appropri-

ate coping strategies according to the sensitivity of the level of exposure. WATSON ET AL. (1998, 1998A) defined vulnerability as a function of sensitivity, adaptability and exposure. Recent studies from developing countries (VILLAGRAN 2011; ARIYABANDU & FONSEKA 2009; OSWALD 2008A; FLORES & WAGNER 2011) suggest a bottom-up approach with resilience-building processes to better cope in a preventive way with the health threats that are related to climate change and are projected to spread during this century.

Some concluding ideas

A widened understanding of health security could contribute to efforts to cope with the negative health effects of global environmental change by putting on its policy agenda (in cooperation with UNEP, UNDP and IFIs) the needs to avoid the destruction and to restore crucial environmental services. This requires a widened health security concept than the state-centred focus adopted by the member states of the WHO. It requires an intersectorial collaboration among different ministries (financial, environmental, social, urban, agricultural and health) to develop an integral and sustainable health strategy. This includes the need for a global health information system

with integrated databases on development, industrial and environmental hazards and the spread of pandemics.

Thus, the member states of the WHO should reconsider their narrow and state-centred health security concept and shift to a human-centred focus, where the prevalence of basic preventive and curative health care is included. It must also include the delivery of basic health services at the local level. The combination of traditional and modern medical and environmental knowledge, and the training of local people, may support such an integral health strategy and both together could strengthen the well-being of the people and the restoration of their ecosystems.

A particular challenge is efficient land planning that establishes equilibrium /among environmental services and development processes, taking population growth, environmental fragility, urbanization and sustainable management of resources fully into account. Governmental capacity and efficiency plays a crucial role for improving health security. In poor countries with multiple health threats solely, participative governance will be able to create resilience of the population to deal with the old, new and often unknown health challenges. Governmental promoted mitigation and adaptation processes against climate change are complementary to bottom-up efforts, and together, they may efficiently combat both existing and emerging health security risks.

A crucial item for complementing these processes is access to affordable and available medications and health services for the world's poorer nations and social groups. To deal with this challenge, human resources may be trained at the local level for supporting health professionals, but drugs and treatments at available prices must also be offered to these countries. Further, special health support and education facilities must be made available

for women as they are crucial in the development process. Their education not only increases the survival of their children (ÁLVAREZ & OSWALD 1993), improves their health and that of their families, but it may also reduce population growth. Improved global maternal and child health programs also require actions such as full vaccination schemes to improve their immunological system, food aid for pregnant and breastfeeding mothers and for undernourished children to avoid long-term brain damages due to chronic malnutrition.

As a result of the impacts of climate change, the WHO and national governments need to systematically monitor the threats and challenges to the health of all affected people. This may also reduce the probability of an outbreak of new epidemics and could avoid the resurgence of eradicated or controlled illnesses (such as tuberculosis). Table 1 indicates that there are different health challenges facing countries with different socio-economic development. Therefore, the conceptualisation of health security should reflect these differences. While traditional disease patterns dominate in poorer countries (related to indoor and water pollution), modern and traditional epidemiological patterns coexist in threshold countries but at the same time, water-born and modern illnesses (related to, for example, overweight, cardiovascular, tobacco, alcohol, etc.) must also be countered. The latter processes also exist in OECD countries.

The Millennium Development Goals (MDGs), as well as human and health security concerns, are complementary tools and approaches for a combined management of human well-being and the environment. A poverty-related lack of education increases health problems due to malnutrition and therefore, reduces human security and environmental services. The recognition that health, develop-

ment, environment and security are interlinked would allow for the alleviation of poverty levels; conservation and restoration of the environment; increase of human security and therefore in a preventive way, enhancement of human health. Thus, a wider human health security concept may be able to integrate these processes and to promote the fulfilment of the MDGs.

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References

- Aldis, W. 2008. Health security as a public health concept: A critical analysis. *Health Policy and Planning*, 23(6): 369-375.
- Álvarez, A.E. & Oswald Spring, Ú. 1993. Desnutrición crónica o aguda materno-infantil y retardos en el desarrollo. *Aportes de Investigación/59*. Cuernavaca: UNAM/ CRIM.
- Annan, K. 2005. *In Larger Freedom: Development, Security and Human Rights: The Millennium Report*. New York: ONU.
- Ariyabandu, M.M. & Fonseka, D. 2009. Do Disasters Discriminate? A Human Security Analysis of the Tsunami Impacts in India, Sri Lanka and Kashmir Earthquake. In: Brauch, H.G., Oswald Spring, Ú., Grin, J., Mesjasz, C., Kameri-Mbote, P., Chadha Behera, N. Chourou, B., Krummenacher, H. (eds.) *Facing Global Environmental Change – Environmental, Human, Energy, Food, Health and Water Security Concepts*. Berlin-Heidelberg-New York: Springer Verlag: 1215-1227.
- Arreguín, F., López Pérez, M. & Marengo Mogollón, H. 2011. Mexico's Water Challenges for the 21st Century. In: Oswald Spring, Ú (Ed.) *Water Research in Mexico. Scarcity, Degradation, Stress, Conflicts, Management, and Policy*. Berlin-Heidelberg-New York: Springer Verlag, in press.
- Arreola-Mendoza, L., Jiménez, L.M., Barsbier, O., Consolación Martínez Saldaña, M., González, F.J.A., Fuárez, F.J. & Sánchez, J.L.R. 2011. Potable Water Pollution with Heavy Metals, Arsenic and Fluorides and its Relation to the Development of Kidney Chronic Illness in the Infant Population of Aguascalientes. In: Oswald Spring, Ú. (Ed) *Water Research in Mexico. Scarcity, Degradation, Stress, Conflicts, Management, and Policy*. Berlin-Heidelberg-New York: Springer Verlag.
- Bogardi, J. & Brauch, H.G. 2005. Global Environmental Change: A Challenge for Human Security-Defining and Conceptualising the Environment Dimension of Human Security. In: Reckemmer, A. (Ed.) *UNEO-Towards an International Environmental Organization-Approaches to a Sustainable Reform of Global Environmental Governance*. Baden-Baden: Nomos. pp. 85-109.
- Brauch, H.G. 2005. *Environment and Human Security. Towards Freedom from Hazard Impacts*. UNU-EHS, Intersection 2. Bonn: UNU-EHS.
- Brauch, H.G. 2005a. *Threats, Challenges, Vulnerabilities and Risks of Environmental and Human Security*. UNU-EHS, Source 1. Bonn: UNU-EHS.
- Bookchin, M. 1988. Social ecology versus deep ecology. *Socialist Review*, 18(3): 9-29.

- Brauch, H.G. 2008. Conceptual Quartet: Security and its Linkages with Peace, Development, and Environment. In: Brauch, H.G., Oswald Spring, Ú., Mesjasz, C., Grin, J., Dunay, P., Behera, N.C., Chourou, B., Kameri-Mbote, P. & Liotta, P.H. (eds.) *Globalization and Environmental Challenges: Reconceptualizing Security in the 21st Century*. Berlin-Heidelberg-New York: Springer Verlag: 65-98.
- Brauch, H.G., Oswald Spring, Ú., Mesjasz, C., Grin, J., Dunay, P., Behera, N.C., Chourou, B., Kameri-Mbote, P. & Liotta, P.H. 2008. *Globalization and Environmental Challenges: Reconceptualizing Security in the 21st Century*. Berlin-Heidelberg-New York: Springer Verlag.
- Brauch, H.G., Oswald Spring, Ú., Grin, J., Mesjasz, C., Krummenacher, H., Behera, N.C., Chourou, B. & Kameri-Mbote, P. 2009. *Facing Global Environmental Change: Environmental, Human, Energy, Food, Health and Water Security Concepts*. Berlin-Heidelberg-New York: Springer Verlag.
- Buzan, B., Wæver, O. & de Wilde, J. 1998. *Security. A New Framework for Analysis*. Boulder, Co.: Rienner.
- Chen, L., Fukuda-Parr, S. & Seidensticker, E. 2003. *Human Insecurity in a Global World*. Cambridge, MA: Harvard University Press.
- Chen, L., Leaning, J. & Narasimhan, V. 2003a. *Global Health Challenges for Human Security*. Cambridge, MA: Harvard University Press.
- Chen, L. & Narasimhan, V. 2003b. Global Health and Human Security. In: Chen, L., Fukuda-Parr, S. & Seidensticker, E. (eds.) *Human Insecurity in a Global World*. Cambridge, MA: Harvard University Press: 183-194.
- Chen, L. & Narasimhan, V. 2003c: A Human Security Agenda for Global Health. In: Chen, L., Leaning, J. & Narasimhan, V. (eds.) *Global Health Challenges for Human Security*. Cambridge, Mass.: Harvard University Press: 3-12.
- Crutzen, P.J. 2002. Geology of mankind. *Nature*, 415(3): 23.
- Crutzen, P.J. & Stoermer, E.F. 2000. The Anthropocene. *IGBP Newsletter*, 41: 17-18.
- Dalby, S., Brauch, H.G. & Oswald Spring, Ú. 2009. Environmental Security Concepts Revisited: Towards a Fourth Phase of Research. In: Brauch, H.G., Oswald Spring, Ú., Grin, J., Mesjasz, C., Krummenacher, H., Behera, N.C., Chourou, B. & Kameri-Mbote, P. (eds.) *Facing Global Environmental Change: Environmental, Human, Energy, Food, Health and Water Security Concepts*. Berlin-Heidelberg-New York: Springer-Verlag: 787-797.
- Fischer, I. & Salehin, M.M. 2009. Health and Poverty: As Challenges for Human, Health and Livelihood Security: Two case studies on Northern Vietnam and Bangladesh. In: Brauch, H.G., Oswald Spring, Ú., Grin, J., Mesjasz, C., Krummenacher, H., Behera, N.C., Chourou, B. & Kameri-Mbote, P. (eds.) *Facing Global Environmental Change: Environmental, Human, Energy, Food, Health and Water Security Concepts*. Berlin-Heidelberg-New York: Springer-Verlag: 563-572.
- Flores Palacios, F. & Wagner, W. 2011. Conceptualization of Social Representations in Relation to the Risk of HIV-AIDS in Local Communities. In: Brauch, H.G., Oswald Spring, Ú., Mesjasz, C., Grin, J., Kameri-Mbote, P., Chourou, B., Dunay, P. & Birkmann, J. (eds.) *Coping with Global Environmental Change, Disasters and Security - Threats, Challenges, Vulnerabilities and Risks*. Berlin-Heidelberg-New York: Springer Verlag: 1081-1090.
- General Direction of Epidemiology (Ministry of Public Health) 1984-2008. *Statistical Series*. Mexico City: SSA.
- Leaning, J. 2009. Health Security for the 21st century: Conceptualisation in Medicine and Health Sciences. In: Brauch, H.G., Oswald Spring, Ú., Grin, J., Mesjasz, C., Krummenacher, H., Behera, N.C., Chourou, B. & Kameri-Mbote, P. (eds.) *Facing Global Environmental Change: Environmental, Human, Energy, Food, Health and Water Security Concepts*. Berlin-Heidelberg-New York: Springer Verlag: 541-552.
- Ogata, S., & Sen, A. 2003. *Human Security Now*. New York: Commission on Human Security.
- Oswald Spring, Ú. 2007. Human, Gender and Environmental Security: A HUGE Challenge. In: Oswald Spring, Ú. (Ed.) *International Security, Peace, Development, and Environment, Encyclopedia on Life Support System/UNESCO*. Oxford: Oxford University Press.
- Oswald Spring, Ú. 2008. Peace and Environment: Towards a Sustainable Peace Seen from the South. In: Brauch, H.G., Oswald Spring, Ú., Mesjasz, C., Grin, J., Dunay, P., Behera, N.C., Chourou, B., Kameri-Mbote, P. & Liotta, P.H. (eds.) *Globalization and Environmental Challenges: Reconceptualizing Security in the 21st Century*. Berlin-Heidelberg-New York: Springer Verlag: 113-126.
- Oswald Spring, Ú. 2008a. Globalization from Below: Social Movements and Altermundism. Reconceptualizing Security from a Latin American Perspective. In: Brauch, H.G., Oswald Spring, Ú., Mesjasz, C., Grin, J., Dunay, P., Behera, N.C., Chourou, B., Kameri-Mbote, P. & Liotta, P.H. (eds.) *Globalization and Environmental Challenges: Reconceptualizing Security in the 21st Century*. Berlin-Heidelberg-New York: Springer Verlag: 379-402.
- Oswald Spring, Ú. 2009. A HUGE Gender Security Approach: Towards Human, Gender and Environmental Security. In: Brauch, H.G., Oswald Spring, Ú., Grin, J., Mesjasz, C., Krummenacher, H., Behera, N.C., Chourou, B. & Kameri-Mbote, P. (eds.) *Facing Global Environmental Change: Environmental, Human, Energy, Food, Health and Water Security Concepts*. Berlin-Heidelberg-New York: Springer Verlag: 1165-1190.
- Oswald Spring, Ú. & Brauch, H.G. 2011. Conclusions. Coping with Global Environmental Change – Sustainability Revolution and Sustainable Peace. In: Brauch, H.G., Oswald Spring, Ú., Mesjasz, C., Grin, J., Kameri-Mbote, P., Chourou, B., Dunay, P. & Birkmann, J. (eds.) *Coping with Global Environmental Change, Disasters and Security - Threats, Challenges, Vulnerabilities and Risks*. Berlin-Heidelberg-New York: Springer Verlag: 1487-1504.
- Oswald Spring, Ú. & Brauch, H.G. 2010. Conclusions. Coping with Global Environmental Change – Sustainability Revolution and Sustainable Peace. In: Brauch, H.G., Oswald Spring, Ú., Mesjasz, C., Grin, J., Kameri-Mbote, P., Chourou, B., Dunay, P. & Birkmann, J. (eds.) *Coping with Global Environmental Change, Disasters and Security - Threats, Challenges, Vulnerabilities and Risks*. Berlin-Heidelberg-New York: Springer Verlag, in press.
- Rodier, G. & Kindhauser, M.K. 2009. Global Health Security: The WHO Response to Outbreaks Past and Future. In: Brauch, H.G., Oswald Spring, Ú., Grin, J., Mesjasz, C., Krummenacher, H., Behera, N.C., Chourou, B. & Kameri-Mbote, P. (eds.) *Facing Global Environmental Change: Environmental, Human, Energy, Food, Health and Water Security Concepts*. Berlin-Heidelberg-New York: Springer Verlag: 529-540.
- Schellnhuber, H.J., Cramer, W., Nakicenovic, N., Wigley, T. & Yohe, G. (eds.) 2006. *Avoiding Dangerous Climate Change*. Cambridge: Cambridge University Press.
- Sen, A. 1995. *Inequality Reexamined*. Cambridge, Mass.: Harvard University Press.
- UNDP 1994. *Human Development Report 1994*. New York: Oxford University Press.
- Villagrán de León, J.C. 2011. Vulnerability Assessment in the Context of Tsunami Early Warning. In: Brauch, H.G., Oswald Spring, Ú., Mesjasz, C., Grin, J., Kameri-Mbote, P., Chourou, B., Dunay, P. & Birkmann, J. (eds.) *Coping with Global Environmental Change, Disasters and Security - Threats, Challenges, Vulnerabilities and Risks*. Berlin-Heidelberg-New York: Springer Verlag: 1441-1450.
- Wæver, O. 1995. Securitization and Desecuritization. In: Lipschutz, R.D. (Ed) *On Security*. New York: Columbia University Press: 46-86.
- Wæver, O. 1997. *Concepts of Security*. Copenhagen: Department of Political Science.
- Wæver, O. 2000. The EU as a Security Actor. In: Kelstrup, M. & Williams, M.C. (eds.) *International Relations Theory and the Politics of European Integration. Power, Security and Community*. London: Routledge.
- Wæver, O. 2008. The Changing Agenda of Societal Security. In: Brauch, H.G., Oswald Spring, Ú., Mesjasz, C., Grin, J., Dunay, P., Behera, N.C., Chourou, B., Kameri-Mbote, P. & Liotta, P.H. (eds.) *Globalization and Environmental Challenges: Reconceptualizing Security in the 21st Century*. Berlin-Heidelberg-New York: Springer Verlag: 581-593.
- Watson, R.T., Dixon, J.A., Hamburg, S.P., Janetos, A.C. & Moss, R.H. 1998. Protecting Our Planet; Securing Our Future: Linkages among Global Environmental Issues and Human Needs. UNEP, US NASA & The World Bank.
- Watson, R.T., Zinyowera, M.C., Moss R.H. & Dokken, D.J. 1998a. *The Regional Impacts of Climate Change. An Assessment of Vulnerability*. Cambridge: Cambridge University Press.
- WHO (World Health Organization) 2002. Emerging Food-borne Diseases. *WHO fact sheet 124*. Geneva: World Health Organization.
- WHO (World Health Organization) 2002a. *Global Crisis – Global Solutions. Managing Public Health Emergencies of International Concern through the Revised International Health Regulations*. WHO/CDS/CSR/GAR/2002.4. Geneva: World Health Organization.
- WHO (World Health Organization) 2002b. *Understanding the BSE Threat*. WHO/CDS/CSR/EPH/2002.6. Geneva: World Health Organization.
- WHO (World Health Organization) 2003. *World Global Strategy on Diet, Physical Activity and Health*. [Online]. WHO. Available from: <http://www.who.int/hpr/gs.strategy.document.shtml> [Date accessed: 12.04.2010].
- WHO/FAO (World Health Organization / Food and Agricultural Organization) 2003a. *Diet, Nutrition and the Prevention of Chronic Diseases*. [Online]. WHO. Available from: http://whqlibdoc.who.int/trs/WHO_TRS_916.pdf [Date accessed: 12.04.2010].
- WHO/FAO (World Health Organization / Food and Agricultural Organization) 2003a. *Diet, Nutrition and the Prevention of Chronic Diseases*. [Online]. WHO. Available from: http://whqlibdoc.who.int/trs/WHO_TRS_916.pdf [Date accessed: 12.04.2010].
- Wolfers, A. 1962. National Security as an Ambiguous Symbol. In: Wolfers, A. (Ed) *Discord and Collaboration. Essays on International Politics*. Baltimore: Johns Hopkins University Press: 147-165.