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Panel: Climate Change, Environmental Stress, and Conflict

PEISOR Model: Climate Change from
A Human, Gender and Environmental (HUGE) Security Perspective[1]

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The PEISOR model facilitates the analysis of climate change, societal outcomes and security. It addresses the linkages between the earth and human systems and their effects, impacts, societal outcomes and policy response. Stimulated by several stimulus-response models, the PEISOR model integrates results of the debate on environmental security and on the impacts of global environmental change in five stages: *P* (*pressure*) refers to drivers of global environmental change; *E* to the *effects* of the linear, non-linear or chaotic interactions on environmental scarcity, degradation, and stress; *I* to extreme *impacts* of human-induced and climate-related natural hazards (storms, flash floods, flooding, landslides, drought); *SO* to *societal outcomes*: internal displacement, migration, urbanization, crises, conflicts, state failure, and R to *response* by the society, the business community, the state where knowledge makes a difference. The security implications of past and potential future impacts have been assessed in the framework of different security concepts of national, international as well as human, environmental and gender security with different reference objects and policy agendas.

Keywords: Climate change, securitization, national, international, human, environmental, gender security (HUGE security), PEISOR model, pressure, effects, environmental stress, extreme impacts, natural hazards, societal outcomes, displacement, migration, crises, conflicts, state failure, response, state, society, business, knowledge

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[1] This paper refers to work in progress and emerged from previous chapters of the authors, where detailed references can also be found on the completed publication project on the reconceptualization of security (Brauch (2008, 2009), on the PEISOR model for the analysis of the complex interactions between the natural and the human systems (Brauch 2009; Brauch/Oswald Spring 2009) for the analysis of the climate change-security nexus (Scheffran/Brzoska/Brauch/Link/Schilling 2012). The model was applied by Oswald Spring (2012) for the analysis of climate induced migration and by Brauch (2012) for possible policy outcomes for a sustainable interregional energy policy across the Mediterranean and between Europe and the Middle East and North Africa (MENA) region. Oswald (2001, 2008, 2009) developed the concept of a human, gender and environmental (HUGE) security concept as scientific approach and as a political project. The bibliographies are at SpringerLink: <http://www.springer.com/series/8090?detailsPage=titles>.

1. Introduction

The reconceptualization of security project addressed three causes for a global rethinking on security: a) the end of the Cold War (1989/1990), b) the process of globalization, c) the impacts of processes of global environmental change (GEC) in the Anthropocene. It referred to three key impacts of a process of a '*widening*' of security (from the narrow political and military concept in the realist discourse to wider economic, societal and environmental dimensions or sectors), of a '*deepening*' from the state-centered concepts of international and national security to people-centered concepts of 'human', 'community', 'livelihood' and 'gender' security and of a '*sectorialization*' of security (e.g. water, food, soil, health, energy security). This global debate has been documented in the *Global Human and Environmental Security Handbook for the Anthropocene* (Brauch et al. 2008, 2009, 2011).[2] In this handbook both the PEISOR model and the HUGE concept were published.

This paper refers to our individual and joint work during the past decade and tries to bring together for the analysis of the climate change and security nexus these two components:

- The PEISOR process model of nature-human interactions that gradually emerged from the simple stimulus-response and the OECD, UN-CSD und EU's EEA models taking the results of the second stage of the empirically-oriented environmental security debate of the 1990s (see the work of the research teams inspired by Homer-Dixon and Bächler) and of the *Millennium Ecosystem Assessment* (MA 2005; Leemans 2009) into account.

- A *human, gender and environmental* (HUGE) security concept, perspective, approach and program.

This paper addresses the following research questions:

- Which insights may the PEISOR model contribute for the analysis of the complex interaction between the earth system and the human system for climate change impacts on security from the stages of the *pressure*, *effects*, *impact*, *societal outcome* to *policy response*?

- Which contribution may a people-centered *human, gender and environmental* (HUGE) security perspective contribute in contrast to the state-centered national security perspective on the climate-security nexus that dominates the scientific discourse and policy debate?

This paper is structured in six parts. After a brief review of the evolution of models on earth and human systems interaction (2), the evolution of the PEISOR model is introduced (3), the present debate on the climate change-security-conflict nexus is noted (4), and the HUGE concept is briefly sketched (4). In the conclusion innovative aspects of the interaction of both are highlighted (5) why they may offer new analytic tools and action-related perspectives for the emerging debate on the climate change and security nexus.

The policy debate and the scientific analyses on the impacts of climate change on society and on the perception of its real and potential security implications has distinguished among three conceptual levels of international security (UN since 2007; EU since 2008), on national security (UK, US since 2004) and on human security (GECHS, HSN, IPCC) and in the emerging scientific debate (Barnet/Adger 2007; Brauch 2002, 2007, 2008; Scheffran *et al.* 2012).

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[2] The three volumes of this handbook can be accessed at: <http://www.afes-press-books.de/html/hexagon.htm> with links to the three volumes and to publisher at: <http://www.springer.com/series/8090> where on the page of the publisher on each book a link to the electronic version can be found via SpringerLink and also to the MyCopy option.

2. Evolution of Models Addressing Nature-Human Interactions

Three models on the nature-human interactions inspired the evolution of PEISOR model: the pressure-state-response models (2.1), the models used by the Toronto and Swiss schools on linking environmental scarcity, degradation, and stress (2.2), and the model of the *Millennium Ecosystem Assessment* (2.3).

2.1 Pressure-State-Response Models of OECD, UNCSD, and EEA

Instead of a simple stress-response model that claims direct links between stress factors and societal responses, the *Pressure-State-Response* (PSR) model of *OECD* (1994; 1998; 1999; 2001; 2001a) assumes that human activities put pressure on nature that leads to environmental changes (climate change, water and soil degradation, biodiversity loss) to which the state and society respond with socio-ecological measures and programs.

The OECD's PSR model distinguished between 'pressure' (P), 'state of the environment' (S), and 'response' (R) indicators. '*Pressure*' include as key factors population growth, consumption, poverty, '*state*' refers to the environmental conditions that emerge from this pressure such as air pollution, deforestation, degradation that influence human health and well-being, and '*response*' points to the activities of society to avoid, prevent, and reduce negative impacts on ecosystem services and to protect natural resources. Between these three elements of the PSR model there are many complex interactions related to resource transfers, information, and decisions.

The UN Commission for Sustainable Development (UN-CSD) used a slightly modified framework called DSR (*Driving Force-State-Response*) model. The European Environment Agency (EEA 1998) has developed a *Driving Force – Pressure – State – Impact – Response* (DPSIR) model with the potential of development of environmental indicators.

2.2 Models on Environmental Scarcity, Degradation, and Stress

The Toronto Group analyzed linkages between environmental stress factors and conflicts (Homer-Dixon 1991, 1994). Homer-Dixon (1994: 39) argued: "that environmental scarcity causes violent conflict. This conflict tends to be persistent, diffuse, and sub-national". He assumed that "global warming will probably not have a major effect for several decades, and then mainly by interacting with already existing scarcities" (Homer-Dixon, 1994: 31). Levy (1995: 35-62) commented that it "is of very little importance" that environmental problems constitute security risks for the USA, and he argued "that ozone depletion and climate change are the only significant environmental problems that currently pose a direct physical harm to US interests" (Levy 1995: 61-62). In reply, Homer Dixon (1995: 189) stated that climate change "could endanger core American values" and thus could become "direct threats to US security interests", but not in the near-term.

A second project analyzed the links between environment, population, and security based on case studies (Homer-Dixon/Blitt 1998) with two patterns of interaction: *resource capture* by powerful groups, and *ecological marginalization* resulting in a lack of access for the poor segments of the society that are often forced to migrate to ecologically fragile and vulnerable regions. In 1999 Homer-Dixon, looked at five future types of likely violent conflicts that third world countries will be less able to prevent: 1) disputes from local environmental degradation; 2) ethnic clashes arising from population migration and deepened social cleavages; 3) civil strife (insurgency, banditry, coups d'état); 4) interstate war (on water), and 5) North-South conflicts over global environmental problems (global warming, ozone depletion, biodiversity). He considers the first and last type unlikely and interstate scarcity wars as least likely and discussed the scarcity's causal role between: *Environmental Scarcity → Social*

Effects → *Violent Conflict*. With continued population growth, the decrease in quality of renewable resources can either result in *resource capture* and *unequal resource access*.

The *Environment and Conflicts Project* (ENCOP), co-directed by Günther Bächler and Kurt R. Spillmann (Bern and Zürich group), started from the premise that environmental transformation does not directly result in conflicts but that existing socio-economic conflict potentials may escalate. According to ENCOP's analytical framework (Bächler 1993; Libiszewski 1992, 1996: 339-340) the analysis of environmental conflict followed four steps: 1) to describe the environmental situation on the background of human activities; 2) to deduce the social and economic effects of environmental transformation and degradation; 3) to analyze the political implications of these socio-economic effects and conflicts arising from them; and 4) to evaluate approaches to peaceful management and resolution on different levels of analysis. ENCOP concluded that besides resource degradation other contextual factors were decisive for conflicts, and "while conflict and environmental change are related in many ways, conflict is more likely to be linked directly to the disruptions of modernity" (Dalby 2002: 97).

Bächler (1998: 40-44) provided a typology of 40 environmental conflicts with different conflict intensity he categorized as: 1) *intrastate* a) ethnopolitical, b) center-periphery, and c) regionalist migration/displacement conflicts; 2) *intrastate* conflicts with a transboundary dimension, caused by a) migration, b) demographic pressure, and c) water/river basin conflicts (28-39); and 3) *international* global environmental conflicts.

Both approaches developed an empirical basis for the primarily policy-oriented discourse that added an environmental dimension to the US national security agenda in the post-Cold War era which succeeded during the Clinton administration but was discontinued during the administration of George W. Bush (Matthew/McDonald 2009) and taken up again by the Obama Administration (Brauch 2011) with its focus on climate change and national security.

Why a critical socio-economic constellation escalated into violent conflict, and when and why they could be avoided by bilateral and multilateral cooperation of states, experts, and representatives of civil society could not be explained by these studies.[3] After a decade of research a consensus emerged that "environmental stress is rarely considered to be the sole factor in precipitating conflict" both within and between nations. Schwartz (2002: 137) considered population growth as closely linked with environmental stress. Among the wide-ranging environmental factors he included ozone depletion and global warming, and among the localized ones those environmental factors that affect small areas at different times (desertification, water pollution). He pointed to "five pathways to indirect internal conflict that involve environmental stress: economic decline, migrations, social fragmentation, erosion of civil society, and curtailment of the state". The complex interaction of environmental stress and its social, economic, and political ramifications has often resulted in increasing urban violence.

Gleick (1989) noted that global warming could affect freshwater availability and food productivity, and that this would have severe impacts on poorer nations. Direct internal conflict has occurred as a result of environmental stress, e.g. in the Sahel (due to drought) where many nomads clashed with farmers in less affected zones. Hauge and Ellingsen (1998) integrated environmental degradation (soil erosion, deforestation) into a model of civil war. Gleditsch (2002) suggested that resource and environmental aspects of conflict "should be examined within the context of a broader view of armed conflict" with a special focus on politics, economics, cultural factors, and the conflict history.

2.3 Model of the Millennium Ecosystem Assessment

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[3] This approach was criticized by Diehl/Gleditsch (2001, 2001a); Peluso/Watts (2001); Hartmann (2001: 39-62, 2004); Bannon/Collier (2003); see overview in Brauch (2003, 2007); Dalby/Brauch/Oswald (2009); Oswald Spring/Brauch/Dalby (2009) and Brauch/Dalby/Oswald Spring (2011).

A different model was used by the Millennium Ecosystem Assessment (MA, 2003, 2005) where direct and indirect drivers of change produce direct effects on human well-being and ecosystem services. In this framework besides the material minimum for a good life, health, and good social relations, security is considered as one of the key elements of human well-being that influence the freedom of choice. Security was defined as: a) the ability to live in an environmentally clean and safe shelter, and b) the ability to reduce vulnerability to ecological shocks and stress (MA 2005; Leemans 2009).

In the words of the Human Security Commission (CHS 2003) this refers to two basic principles: 'protection' and 'empowerment'. These models allowed to develop environmental indicators and to guide the ecosystem assessment. But they did not focus – from a security perspective – on the linkages between processes of global environmental and climate change, as well as natural hazards and their socio-political consequences.

3.   The PEISOR Model

The PEISOR model that was initially developed by Brauch (1998, 2005, 2007a, 2008, 2009) and later slightly revised by Brauch and Oswald Spring (2009) combines five stages:
- *P* (*pressure*) refers to eight drivers of global environmental change;
- *E* to the *effects* of the linear, non-linear or chaotic interactions within the 'hexagon' on environmental scarcity, degradation, and stress;
- *I* to extreme or fatal *impacts* of human-induced and climate-related natural hazards (storms, flash floods, flooding, landslides, drought);
- *SO* to *societal outcomes*: internal displacement, migration, urbanization, crises, conflicts, state failure, and
- R to *response* by the society, the business community, the state where both traditional and modern technological knowledge can make a difference.

Figure 1: Revised PEISOR-Model. **Source:** Brauch and Oswald Spring (2009).
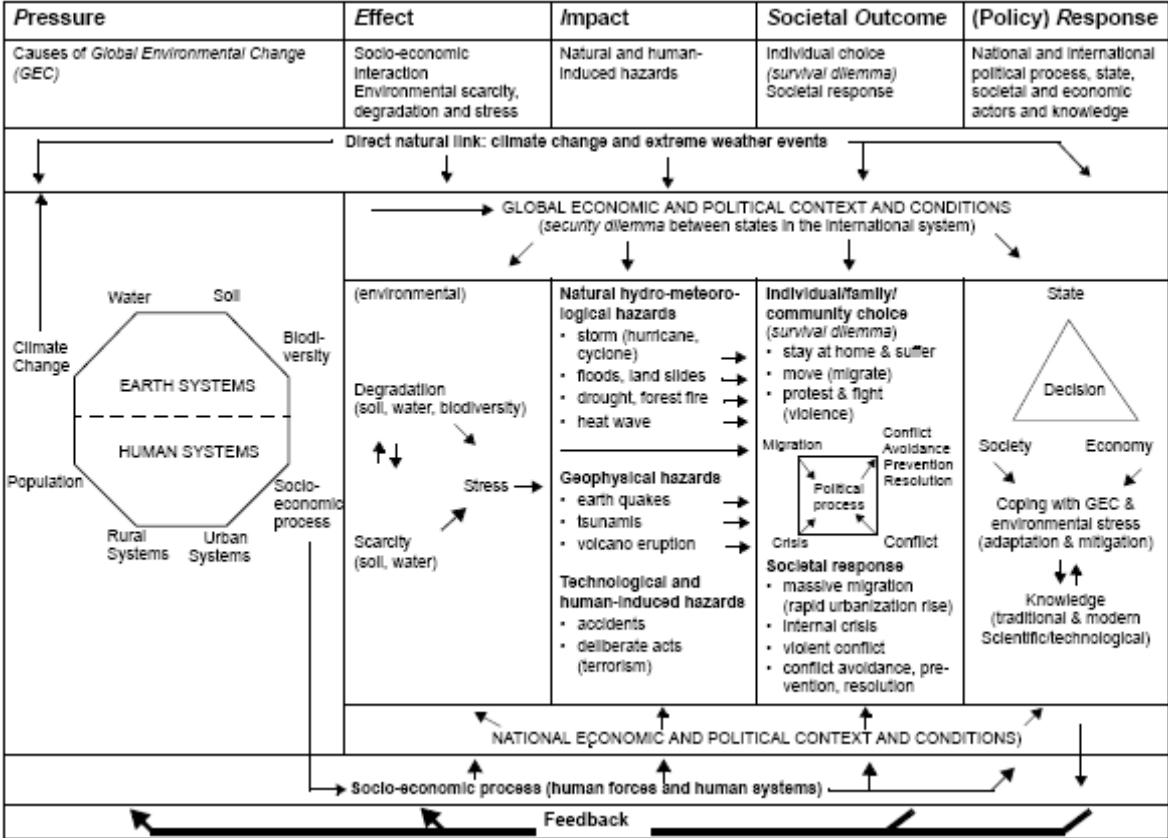
Environmental stress may increase the impact of hazards (especially for those with a high social vulnerability) and cause or contribute (with natural hazards and conflicts) to internal displacement, urbanization, and to forced migration with security consequences. Whether these factors result in domestic crises, disasters, and in violent conflicts, or whether they can be avoided, depends on many specific factors and activities resulting from the interaction between the three actors representing the state, the society, and the business community, but also on the use of both traditional and modern technical and organizational knowledge and knowledge-based response strategies by governments and international organizations and transnational societal and economic organizations (governance). The PEISOR model inter-links the 'pressure' among the components of the natural and the human system (figure 1).

Figure 2 refers to the environmental quartet (soil, water, climate, biodiversity) and the complex interactions and feedbacks between the earth and human systems for understanding the impact of climate change, water stress and biodiversity loss on soil degradation and desertification. The three small cycles with the factors determining climate change, water stress and biodiversity loss have each different effects on soil degradation and desertification, but also on human activities and their livelihood. The wider cycle representing *Global Environmental Change* (GEC) relates the often chaotic interrelations between the earth and human systems with unpredictable consequences on water pollution, disasters, soil degradation and desertification and their societal outcomes (Brauch/Oswald Spring 2009; Oswald Spring/Brauch 2009).

Figure 2: Environmental Quartet: Desertification and Land Degradation, Climate Change, Water Degradation and Biodiversity Loss. **Source:** Inspired by MA (2005: 17), the figure was developed by the authors and designed by Guillermo A. Peimbert (Mexico).
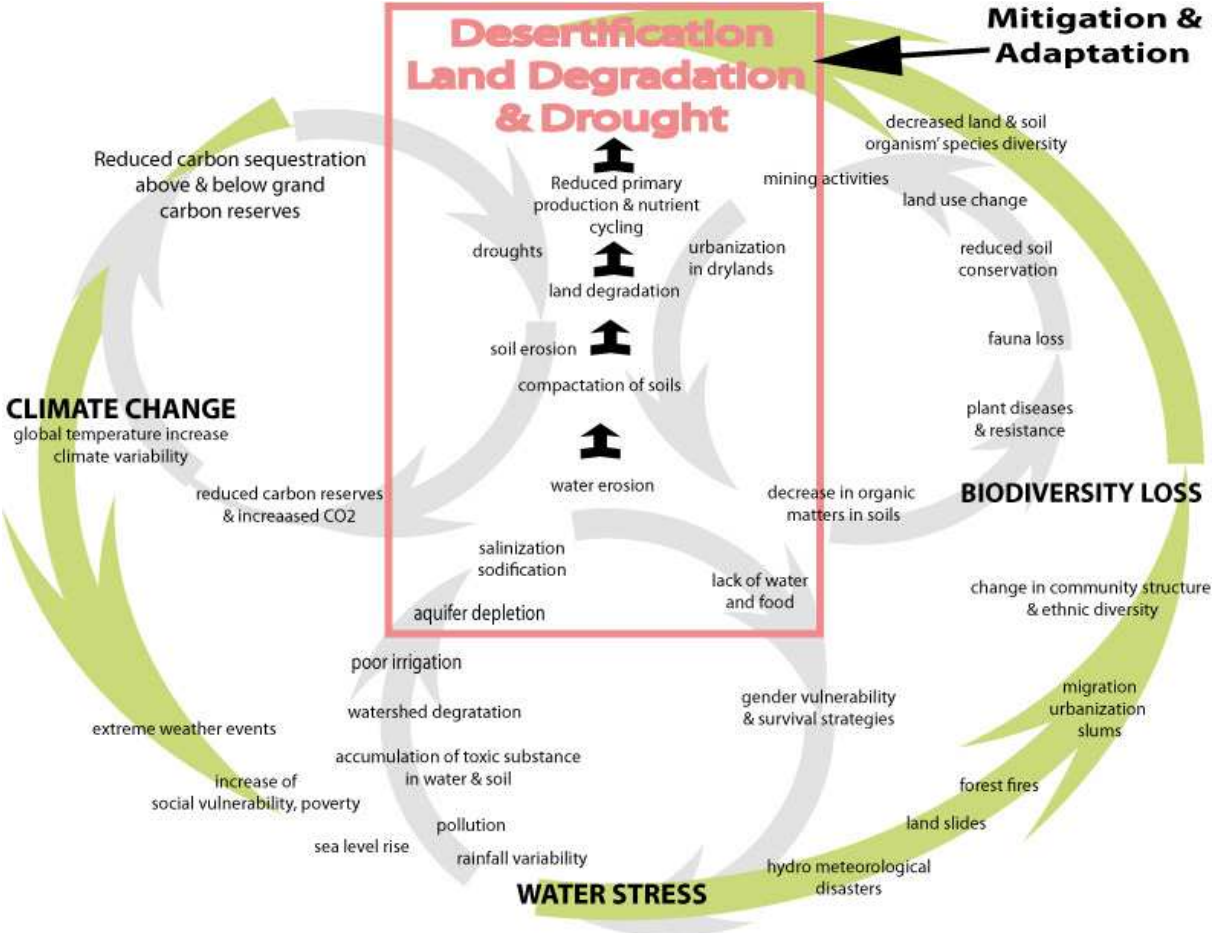
While natural hazards (drought) cannot be prevented, processes of land degradation and desertification can be mitigated by proactive human activities. Therefore, its impact on

societal disasters can be reduced by linking 'protection' with 'empowerment' of the people to become more adapted and resilient. Environmental stress increases the impact of hazards and contributes to internal displacement, urbanization, and forced migration. Whether these factors result in domestic crises, disasters, and violent conflicts, or whether they can be avoided, depend on many specific activities resulting from the interaction among the state, the society, and the business community and on knowledge-based response strategies at all levels.

Of the references to the earth system, climate change and water have been widely securitized. With regard to the human system, population (as people and population growth) has been discussed as another key of national sovereignty. Aspects of the socio-economic processes are being analyzed in the framework of economic and financial security. The economic, societal and environmental dimensions of security cover both the productive and consumptive patterns in rural and urban systems.

3.1. Environmental and Human Pressures (P)

Climate change produces at least four physical impacts: temperature and precipitation changes, rise in sea level and extreme weather events. Societal factors intensify these negative natural outcomes. Rapid population growth and rising food demand fosters land use change and an overexploitation of the soil. The negative interrelationship between natural and societal factors may produce irreversible effects on biodiversity, soil, water and air that may reinforce each other in a chaotic and unpredictable way.

3.2 Ecological Effect (E): Environmental Scarcity, Degradation and Stress

The possible linkages between environmental scarcity, degradation and stress and conflicts are complex. Environmental stress coupled with rapid population growth contributes to internal displacement, migration and slum formation. A second pathway from environmental stress to conflict is through forced migration caused by floods, droughts, locusts or famine linked to deteriorated land and drought.

3.3 Impact (I) of Environmental Stress and of Climate Change on Hazards

The pressure exerted by global climate change has resulted in an increase in the number and intensity of hydro-meteorological hazards and extreme events (IPCC 2012). While drought, forest fires and heat waves have contributed to wind erosion, intensive storms and flash floods have intensified water erosion. On a global level, the impact of extreme weather events differs according to the social, economic and political system that influences the vulnerability of the affected people. Between 1973 to1997 the death toll of disasters is in Africa 49 percent in Asia 41 percent and in Latin-America 7 percent, while the affected in the same order are 8, 88, 3 percent, while the number of disaster represents in the same order 16, 39, 27 percent, followed by Europe with 12 and Oceania with 6 percent (Guha-Sapir et al. 2004).

3.4 Societal Outcomes (SO): Famine, Societal Crises and Conflicts

Climate change, water stress, loss of ecosystem services, land degradation and desertification trigger different societal outcomes, depending on the level of economic development and the degree of environmental and social vulnerability. In drylands the decline in water and food has caused hunger and famine primarily in developing countries. These interrelated natural developments and their severe societal outcomes increase human insecurity and confront the victims with a 'survival dilemma' (Brauch 2008a). The linkage between the four earth system factors and severe societal outcomes has been addressed for possible security impacts of climate change, in a report (WBGU 2008: 1) on *Security Risk Climate Change*.

Migration is a process that covers different features of people's movements from a) rural to rural, b) rural to urban (urbanization), c) temporary 'internal displacements' due to hazards,

conflicts or complex emergencies; d) permanent internal, regional or international South-North migration. Such migrations are complex and environmental factors may force people to leave their homes and traditional livelihoods to survive or to have better prospects for life and human well-being. Land degradation of soils and disasters are powerful factors to forced migration, especially among vulnerable social groups. There is an agreement that environmental factors are not the sole reasons influencing the decision of people to leave. Demographic, socio-economic, and ethnic factors as well as better life quality and income have contributed that young people are leaving rural areas. Whether this leads to environmental conflicts depends on many intervening factors, such as individual attributes, specific vulnerability, functioning institutions and government structures, and other causes of conflicts.

The reviewed societal outcomes of GEC issues resulting in environmentally-, climate- and hazard-induced migration and in national or regional crises and conflicts in the affected regions may further intensify existing environmental stress that in turn may further increase existing political, economic, ethnic and religious conflicts. Environmental stress, droughts, heat waves and forest fires and their societal outcomes also negatively affect the earth system by contributing to a degradation of water and soil as well as the reduction of carbon storage.

3.5 Policy Response (R): Quartet of Knowledge and Three Key Actors

The 'R' in the PEISOR model refers to the policy response where the promotion of best natural resource governance and appropriate technologies can help mitigate the climate process and adapt people to adverse conditions. This requires a political strategy to manage the complexity of nature-human interactions where the emerging global, regional and local risks are linked to multiple and often simultaneous crises.

The development and transmission of traditional, scientific and technological knowledge through policy-relevant research, rapid translation into education and training of the population become crucial. Thus, science and traditional knowledge-based policy strategies are an utmost priority for coping with the impacts of the four factors of the environmental quartet.

The state together with the business community remains the key actor due to its financial and administrative resources to plan, initiate, monitor and implement knowledge-based strategies. In this regard, the specific system of rule and the governance structures matter. However, many weak states in the countries most affected by land degradation and desertification often lack the financial and administrative resources to control their territory and thus to implement land degradation and desertification strategies.

3.6 Securitization of Societal Outcomes and Policy Response

The PEISOR model focuses on a sequence of *pressures* resulting from the interaction of natural and social system components, their *effects* on the socio-economic-political context, as well as on their *impacts*, *societal outcomes* and policy *responses*. In the interaction between the state, society, and the business community, multidisciplinary knowledge creation and application for sustainability and for coping with climate change impacts plays a key role for supporting the coping activities these crucial decision-makers.

The *securitization* of GEC has already triggered a political demand for systematic trans-disciplinary research, and monitoring of these claimed causal linkages to build up knowledge to support policies to recognize (early warning of climate related security risks) and to cope with these security dangers in a proactive way before they lead to violent conflicts. The claimed linkage between climate change and conflicts has already become an additional legitimating component or a 'securitizing move'.

4.   Emergent Debates on the Climate Change-Security Nexus

In 2012, two publications with peer-reviewed articles and chapters on the climate change-security nexus were published, from different theoretical and methodological perspectives. In the introduction to a special issue of the *Journal on Peace Research* on "Climate change and conflict", Gleditsch (2012: 3) noted that from its quantitatively-oriented contributions "firm conclusions cannot always be drawn" and that "the research reported here offers only limited support for viewing climate change as an important influence on armed conflict". In an article on "Climate Wars? Assessing the Claim That Drought Breeds Conflict", from a similar perspective, Theisen, Holtermann and Buhaug (2012: 79-80) argued that "the policy debate on the security implications of climate change has run far ahead of the scientific evidence base".

In their introduction to a volume with 36 peer-reviewed scientific contributions that focused on *Climate Change, Human Security and Violent Conflict – Challenges for Societal Stability* Brauch and Scheffran (2012) distinguished among four different scientific perspectives on the causal linkages and possible extreme and sometimes fatal societal outcomes by:

1. *Determinists* have claimed that climate change will lead to wars during the 21st century. This argument has been made by scientists (e.g. Welzer 2008; Lee 2009), humanitarian organizations, and NGOs and a few governments.

2. *Empiricists* have stressed (Dalby/Brauch/Oswald Spring 2009; Oswald Spring/Brauch/Dalby 2009) that environmental stress and climate change have contributed to forced migration and small-scale violence (Kahl 2003, 2006). They have analyzed the securitization of climate change impacts (Detraz/Betsill 2009: Brauch 2009; Scheffran 2011) and reviewed conflict constellations triggered by climate change (WBGU 2008; Bauer 2011).

3. *Skeptics* have pointed to a lack of evidence in the peer-reviewed and primarily quantitative literature on the link between climate change and wars (Gleditsch/Nordas 2009; Breitmeier 2009; Gleditsch 2012).

4. *Deniers* have challenged the links between climate change and conflicts that may present security threats (Lomborg 2004, 2009; Tetrais 2011, 2011a). Within the context of the UN, Russia, China, and many G-77 countries have considered climate change primarily as an issue of sustainable development, to be addressed by the UNGA, ECOSOC, and UNFCCC, but not as an issue of international peace and security for consideration by the UNSC.

Furthermore, five different genres of publications may be distinguished:

a) *Policy analyses* by consultants have tabled the linkage on the policy agenda of governments and international organizations, what has been successfully achieved by putting it on the agenda of the UNGA, the UNSC and of the UN Secretary-General.

b) *Scenario analyses* were developed with the goal of preparing policymakers for potential future security threats posed by the projected societal impacts of climate change. Such studies have been funded by defense ministries, intelligence agencies (NIC in the USA), and supranational (EU 2008) and international organizations.

c) *Discourse analyses* have analyzed the policy statements of national and international policymakers and press reports in terms of international, national, and human security (Brauch 2009; Detraz/Betsill 2009; Rothe 2012; Kurtz 2012)

d) *Conceptual and model analyses* addressed the linkage between climate change and society as part of the interactions between natural and human systems (Scheffran 2008, 2008a, 2009, 2010).

e) *Theoretical and empirical analyses* have used a wide range of scientific approaches, theoretical orientations, and methods to analyze the 'observed' and 'projected' inter-

relations between four physical effects of climate change (increasing temperature, sea level rise, number and intensity of climate-related natural hazards, and changes in precipitation) on the state, society, and the economic sector and business community, and on individuals, community groups, and humankind.

The authors of these different schools of thought and genres have used different security concepts by pointing to the states as referent objects (international and national security) or to human beings, communities or humankind (human security). While many determinists and skeptics operated within 'state-centered' perspectives focusing primarily on (civil) wars, many empiricists have preferred a human security (Barnett/Adger 2007; Scheffran et al. 2012) or even a human, gender and environment security perspective (Oswald 2001, 2008, 2009).

According to Scheffran, Link and Schilling (2012) there are various possible pathways between climate change and conflict that are influenced by several contextual conditions, intermediate variables, and intervening responses and also circular feedbacks. Their assessment framework of climate-society interaction that represents the causal links between climate change, natural resources and environmental stress, human values and needs, and the societal consequences and instabilities.

The significance of the impacts of climate change on society and security can be deduced from the links between the variables and how events spread along the causal chain or cascade, which is a function of the sensitivities between variables (Kominek/Scheffran 2011). Both Scheffran's (2011) model and the PEISOR model have addressed the sequence of causal factors and feedbacks among the earth and human systems from a human security perspective.

5. A Human, Gender and Environmental: a HUGE Security Approach

On the background of manifold new risks and threats a broader security concept of *Human, Gender and Environmental Security* (HUGE) was proposed as a widened security concept, which combines a broad gender concept that includes all vulnerable groups, such as children, elders, indigenous and other minorities.

5.1 Human Security (HS)

The human security concept is related to unsatisfied human needs and limited access to resources and therefore the lack of human security is understood as 'freedom from fear', 'freedom from want', 'freedom from hazard impacts' and 'freedom to live in dignity'. These four pillars of human security should play together to offer basic resources to any community. This procedure would avoid both under- and over-consumption and could secure the basic needs for anybody, irrespective of geographical, social, age or gender relations by reducing the negative impacts on natural resources. Such a perspective may help enhance the security for the weakest human beings, by turning the focus from the multiple threats on their survival to the new security dangers linked to the impacts of global environmental change.

5.2 Environmental Security (ES)

Due to global environmental and climate change, environmental security has not only been an issue for scientists but increasingly also for politicians. Resource depletion (biodiversity, water, land, air, minerals and fossil hydrocarbons) and their pollution are limiting the supply of ecosystem services for productive processes and life quality that are triggered by higher demand due to population growth, urbanization, food pattern changes and ongoing processes of modernization in developing countries. These factors are pressuring on the demand side, reducing at the same time the supply by polluting crucial resources.

Climate-induced hazards will further affect available resources. This requires special efforts for mitigation, adaptation and sustainable development to improve environmental protection, ecosystem services, food sovereignty (Oswald Spring 2009), conservation of nature as well as higher efficiency in collecting, recycling and re-using of waste and water (Oswald Spring 2011, 2011a; Oswald Spring/Brauch 2009b). While environmental changes and resource access are stressors on social systems, they are not the dominant cause of political violence and social vulnerability. Scarcity alone is not what kills people or causes political violence; numerous other factors, such as power struggle and personal interests, destroy social networks that guarantee their survival.

There is no reason to believe that states or the business community are necessarily acting in ways that enhance the security of their populations. The critical development literature and discussions on political ecology emphasize that state and business actions in support of an exclusive development may be a contributing factor to the vulnerability of social and ecosystems, which are then incapable of ensuring survival when disaster strikes. Neither are states innocent arbiters of disputes, nor are they necessarily benign agencies primarily interested in the welfare of their people.

States may be involved in the violent suppression of the resistance against central rule or to the dislocations of economic globalization and the concomitant commoditization of items essential for the survival (see the global policies of concessions for mineral exploitation). Such an analysis also requires transdisciplinary comparisons for understanding in detail the human-nature interrelationship in different geographical contexts and historical settings.

5.3 Gender Security (GS)

Gender is an analytical tool, socially constructed and the axis of classification that is linked to genital difference; facts that permit a biological explanation of social representations of gender, rules, norms, behavior, values, division of labor, responsibilities, access to resource and power relations, rooting still more the mechanisms of discrimination. Each culture recognizes sexual differences and specifies the characteristics that classify the sexual beings in diverse genders. The number of sexual characteristics varies inter- and intra-culturally, although the generic classification is manifested in all known societies and for this reason is considered a universal classification.

As the relationship between men and women implies complex linkages and relates to human and societal security, the threats are not always perceived as purely confrontational. Nobody is born as a man or woman; everybody is born with a body which acquires a generic significance. From early childhood gender is socialized and consolidated during one's life history. Family structures, schools, work and clubs are organized to subsume gender identity into daily life, avoiding that gender discrimination get perceived and combated. The world has been organized for eight millennia along gender lines with a complex process of gender identity. Worldwide, the results are social difference, exclusion and discrimination between man and women, similar to the gap between rich and poor. Both processes create long-standing insecurities.

Violence against women and girls is the most frequent on earth that usually happens inside the house. This violence against women did not yet lead to a theory on gender security (GS) that is normally taken for granted, socially identified and represented within society. GS is developing slowly in social and gender sciences. Key elements point to the economic security of women with respect to property rights, education and training, equal access to paid work and salaries, regardless of ethnic, religious, and caste differences.

During millennia, society has forgotten that gender relations were socially constructed and reinforced through social representations (Flores 2001; Serrano 2009, 2010, Oswald 2008),

habits, ideology and political systems. Female powers were considered marginal and merely delegated. They can only be exercised with permission of the dominant group (the father, husband, brother or boss), who decide on family expenses, property, productive activities, inheritance and gifts (Lagarde 1990, 2000). Gender insecurity is often not perceived as such, due to the interdependence between patriarchal dominance and female submission that are anchored by personal identity processes (career) and social roles that have been induced and trained during millennia. As a result of this longstanding process, female identity is socially imposed as caring for others and as part of a socialized self-identification (Serrano 2009, 2010).

5.4. Linking Human, Environmental and Gender Security (HUGE)

By linking *human* and *environmental security* with *gender security*, the process of the construction and visibilization of the invisible, of the reproduction of injustices and of the production and ideological circulation process can be understood. Four phases are involved in the consolidation of 'GS': *first*, the process of identity building and social representation; *second*, the gift economy; *third*, the link between the exploitation of women and nature systematized in ecofeminism; and *fourth*, the consolidation of social movements. The transformation of identity patterns, the creation of alternative social representations and the visibilization of the gift-giving economy reinforce cooperation and nurturing of humans and nature. Ecofeminists and social movements have criticized the Euro-American power exercises and ideological domination through propaganda that are able to threaten human, environmental and gender security and proposed a subsistence perspective from bellow (Mies 1998; Bennhold-Thomsen/Mies 1999).

The multiple risks and threats inherent in the neo-liberal economy and post-war progress resulted in a concentration of wealth in a few hands, violence, armed conflicts, and global environmental change. Responding to growing insecurities and political debates on alternatives to the globalization model, Oswald Spring (1991, 2001, 2005, 2009) proposed a HUGE security concept consisting of *Human, Gender and Environmental Security*.

In the security literature disciplinary, male, realist dominance and Western approaches still prevail. HS has broadened the discussion to poverty alleviation, "vivir bien" (livelihood), human rights, governance, gender equity, to decent jobs and social protection through income, self-sufficiency, self-reliance and governmental services. More environmental concerns appear in HS reports; food and livelihood issues; peace and conflict resolution, and new actors and situations are analyzed on the regional level. Gender issues are still marginal (e.g. in several gender networks) but not fully integrated in the power struggles. But an integral concept, linking HS, GS and ES, is still lacking, given growing development and survival risks for humanity as a whole (Beck 2007).

HUGE relies on a wider gender concept and thus differs with the narrow approach focusing on the male-female confrontation prevailing often in feminist discourses in the North. It includes other vulnerable groups such as children, elders, indigenous and minorities with a human-centered focus on ES challenges as well as peace-building and gender equity. This combined *Human, Gender and Environmental Security* (HUGE) concept will contribute both analytically (as a scientific tool for analysis) but also by putting new concerns on the policy agenda (as a policy tool for action by social movements, NGOs, as well as by governments and international organizations).

The historical evolution of the constituent elements also revealed the deepening and widening analysis of GS from socio-psychological identity concerns, to gift-giving, ecofeminism and social movements, where livelihood, food, health and public security, power redistribution, social equality, as well as education, cultural diversity and the overcome of the glass ceiling

are interacting. Therefore, the HUGE proposal intents simultaneously an epistemological critique and a policy advise at several levels and from institutional and grass-root perspectives.

Through the HUGE concept the patriarchal, violent and exclusive structures of millennia within the family and society are scrutinized, and focused to overcome the consolidated gender discrimination, where an alternative 'feminity' and 'masculinity' establish a field of experimentation, based on equality and mutual cooperation. Theoretical and empirical diversity permits on one side a deeper understanding of GS linked up with social deterioration and growing poverty, GEC and armed conflicts in many countries of the world, but also peaceful conflict resolution and negotiation to limited resources. Confronted with increasing risks and threats, social movements and multilateral organizations have launched a discussion on possible alternatives.

A wider security paradigm was developed further within the United Nations, exploring first HS and later environmental, health, food and economic security. More recently GS was added to the policy agenda for overcoming the epistemological barrier of the patriarchal worldview and Eurocentric or Western male imposition.

The *Millennium Development Goals* (MDGs) established specific gender policies, first reversing the present situation of inequality through gender quota, still as a process of positive discrimination, specifically in rural and traditional societies, where the conventional roles are very rigid and the process of gender differentiation are not taken for granted. But this is not enough. Also in progressive and gender sensitive societies, differences and inequalities exist as socially constructed phenomena, and must be eradicated. This means not only reducing the explicit factors of oppression (time, money, preferences, but also to deepen in the social and individual unconsciousness, where psychoanalysis and Marxism pointed to the structural disadvantages of women in existing society. These challenges point to identity processes and social representation that are objectivized and anchored the existing social discrimination, often consolidated by mass media.

In this sense, HUGE reorients HS to overcome structural discrimination processes, where specific government policies, institution building, quota system and legal reinforcements should stimulate political and social participation of women, the young and elders. It deepens GS concerns by transforming existing processes of social representation-building and traditional role assignation and links them to HS and ES processes. Researches on hazards in different world regions have documented that women and girls represents between 69 to 91% of the death toll and thus are more vulnerable. Social vulnerability has grown during and after disasters, conflicts beyond existing violent conditions in daily life made them victims of human trafficking, rape and sexual exploitation.

HUGE focuses on 'ES' concerns where a healthy environment and the capacity for resilience-building for highly vulnerable groups can reduce the impacts of risks associated with hazards. In hazard prone areas, social movements, NGO's and governments are enabling women and other exposed groups to reinforce their own resilience and that of the communities through bottom-up organizations and micro-business (Cadena 2005, 2009). If combined with top-down policies, through institution building and specific tools they are able to guarantee early warning, preventive evacuation, disaster assistance and reconstruction (Villagrán 2011). Thus, social vulnerability in the recovery phase can be reduced. Political and cultural diversity may contribute to nonviolent conflict resolution processes thus possibly reinforcing peace-building in conflict-prone regions with sustainable development (Oswald 2008a).

Resilience-building is related to a horizontal interchange of experiences that reduces risks and strengthens the empowerment of the vulnerable. When supported by world and local solidarity, the international aid after crises, local solidarity then disasters can take out countries

from poverty and conflicts, and specific social groups from marginality. It induces also sustainable development processes. In synthesis, a HUGE security approach integrates social, environmental, human, cultural and identity concerns, offering solidarity, resilience, sustainable peace-building and equity in an insecure and risky world. Such a HUGE approach puts structural inequality and dependency on the top of the policy agenda. Once social facts have been transformed into normative and practical processes of alternatives, the structure of social representations starts to change in daily life. The HUGE concept aims at a sustainable culture of peace and includes widened security concerns (ES, GS and HS). HUGE complements the top-down official human security approach (UNDP 1994) by extending the traditional scope of security though a conceptual *widening*, *deepening* and *sectorialization*, including water, health and food security in first terms.

Since the Rio Earth Summit in 1992, the dangers posed by *Global Environmental Change* (GEC) for the survival of humankind were added to the international agenda. As population and environmental stresses and conflicts on natural resources increase complex strategies are needed from governments, international organizations and organized groups from top-down and at grass-root level to prevent, mitigate and cope with the effects of GEC. HUGE is more than the sum of the three human, environment and gender security concepts. HUGE links the social, physical and ideological components of the three concepts combines the levels of analysis, and assesses the capacity of the system's consistence by self-regulation (figure 5). HUGE focuses policy proposals towards a desirable future for everybody, especially for the highly socially vulnerable. This utopia refers to a decentralized, diverse, sustainable world with equity and dignity, where ecofeminist and ecoindigenist paradigms are implemented for benefit of humanity and nature. Growing complexities prevent predicting the future and its risks (Beck 2007; IPCC 2012) that are growing exponentially with the non-action and immobility of powerful nations and interest groups.

On the policy side, horizontal interchange among social movements, organizations and experiences could strengthen the empowerment of the vulnerable. Solidarity with the poorest countries and social groups, financial aid, debt reductions and genuine support for development are conceptual pillars for a sustainable peace that are able to reduce threats and fears and to strengthen the HUGE perspective. The HUGE concept refers to at least five historical experiences of alternative movements:

1. the nonviolent resistance of indigenous societies;
2. the nonviolent liberation struggle of Gandhi, of feminists for equity and a safe environment, the struggle of Martin Luther King (1998) for human rights and race equality, the peaceful transition from the Apartheid regime by Nelson Mandela (1994), and many peace movements around the globe searching for nonviolent conflict resolution;
3. the struggles for national independence and liberation from military regimes resulting in negotiated peace agreements, truth commissions and later power-sharing processes through democratic elections not only in Latin America, but all over the world;
4. the grass-roots mass organizations offering alternatives to exclusion through an economy of solidarity, locally integrated enterprises, popular banks for microcredits, movements of solidarity and alternative economy and sustainable mixed agriculture with self-reliant small businesses (MST 2005, Santos de Morais 2002);
5. organized religious and solidarity communities, such as the Christian Grass-roots Movement and Buddhist, Jaina and Hinduist monks;
6. the ecofeminist and self-reliance agricultural movements with fair trade and interchange of products and services from all over the world, but especially the Third World countries, often organized in the World Social Forum (Oswald 2008 b, 2009, 2009a).

The confluence and diversity of these different strategies, ideological and political struggles and activities share common basic ethical principles such as plurality, diversity, equity, justice, sustainability, social equality and gender equity. They dream of a globalization with a human face, social integration, gender equity, innovation for people, recovery of nature and ecosystem services, nonviolent conflict resolution, risk reduction and environmental stewardship. They maintained a flexible structure and alliance, avoiding homogenizing ideas and hegemonic strategies of struggle, such as co-optation processes and male power hierarchies within global organizations (Oswald 2008).

Their respect for diversity, voices of the voiceless and empowering of the socially vulnerable were explored in different ways. The varied strategies of survival, self-reliance and resistance-building processes have been collectively analyzed through diverse past experiences. Understanding the root causes, new threats and experiences are permitting new alliances and alternative grass-root strategies, linking peaceful conflict resolution, environmental care and recovery to social development with self-reliant food sovereignty, where interchanges and traditional technologies merge with modern ones. With the conciliation of conflicts, migration and the informal and illegal labor market was reduced.

This utopia includes a transformation of the traditional role of military as defense of territory and national sovereignty and both military and police can be trained for civil protection and disaster management, to protect citizens from hazard impacts by reinforcing early warning, evacuation, disaster risk reduction and rebuilding processes. New investments in education and culture may consolidate a sustainable development process with environmental restoration in areas of high-risk. This may reduce threats, and consolidate security in hazard-prone regions. Facing new threats from global environmental and climate change conscious communities and social groups may create resistance and resilience and can reinforce governmental actions for protection, preventive leaning and risk reduction.

Linking human, environmental and gender security with peace-building and risk reduction the concept of the "Anthropocene suggests the interconnection of human and ecological matters [which] needs to be understood in a way that transcends the divisions between the natural and the human that have structured thinking about security and especially identity since the emergence of modernity. We are not on earth; we are part of an ecosystem we are changing." (Oswald Spring/Brauch/Dalby 2009: 1294)
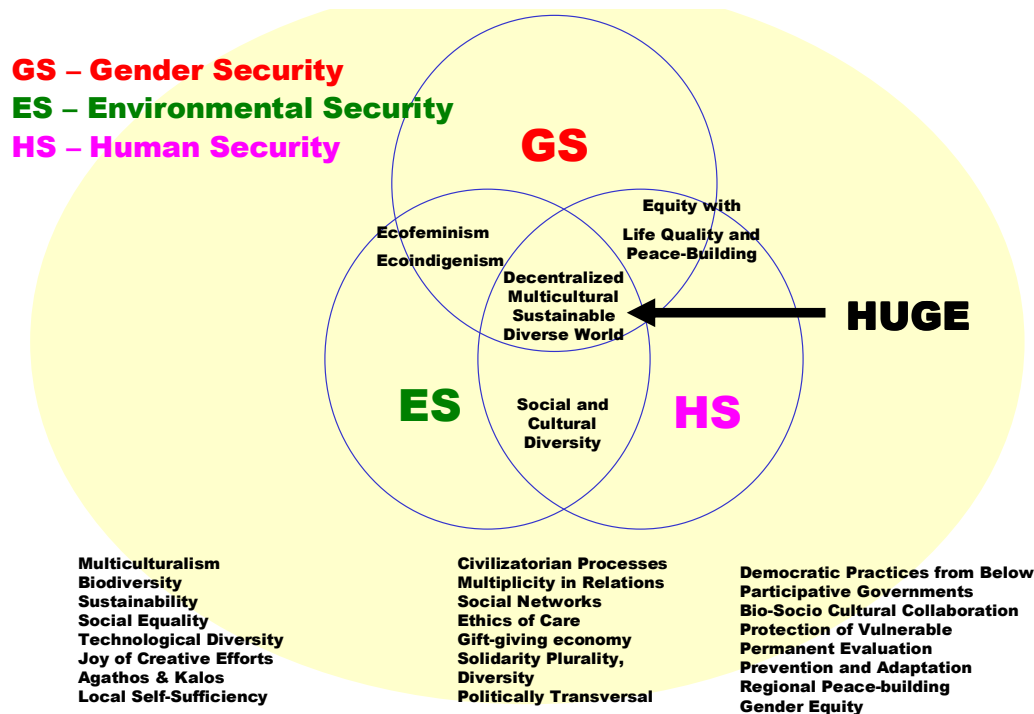
These processes may enhance the four pillars of the human security concept as freedom 'from fear', 'from want', 'from hazard impacts' and 'to live in dignity', consolidating peaceful behavior with an active and equal participation of women, elders and children, bringing new energy into decentralized developing models that can consolidate nonviolent daily interacttions and a new feminity and masculinity. Emerging conflicts may be resolved through nego-tiation and conciliation; where the vulnerable receive an opportunity to express their concerns and the solutions are proposed on equal terms, offering to the conflicting parties a win-win opportunity.

Physical and structural violence is inherent in the present highly competitive free-market system and its present mechanisms of regressive globalization. The Socialist utopia was destroyed by repressive and bureaucratic communist regimes in the Soviet Union and in Eastern Europe. Which utopia is left to develop such ethical principles, a communitarian responsibility, gender visibility and environmentally sustainable development to establish a 'post-modern democracy based on consensus', with equity, representation and quality of life?

The history of wars, domination and destruction brought poverty and death for the masses and the loss of empires, where only few have benefited. Such an emerging civilization may guarantee a diverse, just, equitable and sustainable co-existence, taking care of the vulnerable? This is a challenge for scientists, peace researchers, feminists, environmentalists,

educators, politicians and actors, and this HUGE vision has to be developed locally to find concrete answers for these new challenges, but also globally to change the root causes of patriarchy producing violence, domination and destruction.

Figure 5: Human, Gender and Environmental Security: A HUGE Scientific Concept and an Approach for Action in the Anthropocene. **Source:** Oswald Spring (2009: page).

GS – Gender Security
ES – Environmental Security
HS – Human Security

GS

Ecofeminism
Ecoindigenism

Equity with
Life Quality and
Peace-Building

Decentralized
Multicultural
Sustainable
Diverse World

HUGE

ES   Social and
Cultural
Diversity   HS

Multiculturalism
Biodiversity
Sustainability
Social Equality
Technological Diversity
Joy of Creative Efforts
Agathos & Kalos
Local Self-Sufficiency

Civilizatorian Processes
Multiplicity in Relations
Social Networks
Ethics of Care
Gift-giving economy
Solidarity Plurality,
Diversity
Politically Transversal

Democratic Practices from Below
Participative Governments
Bio-Socio Cultural Collaboration
Protection of Vulnerable
Permanent Evaluation
Prevention and Adaptation
Regional Peace-building
Gender Equity

Gender Security
GS
Equality
Participation
Internal Conflict Resolution
Family Integration
Satisfaction of Human Needs
Care of Children
Care of Elderly
Care of Family
Care of Nature
Solidarity
Responsible Reproduction
Sharing
Joy of Life

Human Security
HS
Life Conditions
Poverty Alleviation
Social Gap Reduction
Social Security
Public Security
Democracy
Justice
Transparency
Confidence
Decentralization
Liberty
Eradication of Corruption
Trust
Cooperation

Environmental Security
ES
Sustainability
Bio-Rationality
Biodiversity
Protection
Prevention
Recovery
Reduction in Use
Recycling of Waste
Reuse
Eco-defensive Production
Saving of Resources
Energy Efficiency
Self-Sufficiency
Food Security

Human & Gender Securities
HGS
Nutrition Security
Health Improvement
Life Quality
Conflict Resolution
Self Determination
Education with Ethic
Women as Epistemic Subjects
Social Responsible Acts
Communitarian Wealth
Socialization for Change
Feminization of Decision-making
Antiwar activities
Cultural Diversity
Local Solidarity
Humanization of Production

Human & Environmental Securities
HES
Biocentrism
Anthropocentrism
Reduction Consumerism
Ethical Tech. Development
Humanized Technology
Sustained Dynamic Stagnation
Global Articulation
Local Production
Institutions, Environmental Laws
Environmental Services
Reduction of Pollution
Safe Management of Toxics
Human- Nature Relation

Gender & Environmental Securities
GES
Food Production
Safe Food Transform.
Self-Sufficiency
Culturally Accept. Food
Permanent, Safe Food
Waste Management
Organic Production
Rational Management
Local Markets
Administration of Nature
Green Promotion
Human-Nature Rights
Education through Nature
Integral Soc. Security

6. Conclusions

Contributing to the theme of this panel on "climate change, environmental stress, and conflict" this paper introduced with the PEISOR model a general tool for the construction of specific causal models that address selected features of the interaction between factors within and between the earth and human system and their positive and negative feedbacks. In many analyses on the climate change and security nexus potential security threats and linkages are addressed from an international security perspective. Many policy statements and scientific studies have focused only on a state-centered military security concept. But in the policy debates in the UN and in the three emerging parallel discourses on environmental, human and gender security the new threats and risks posed by GEC have only partly been addressed.

The suggested HUGE security concept matters both as an analytic tool for analysis and as policy guidance for proactive action. By linking the PEISOR model with the HUGE perspective, the authors suggest to broaden the scope both of conceptual, theoretical and empirical research on the climate change-security nexus. Our individual and joint work on the PEISOR model and on the HUGE perspective is still in progress. Both authors welcome critiques and suggestions in order to develop both further and to apply them in their future empirical work on societal outcomes of environmentally- and climate-induced societal processes. The Earth and humankind are in a critical situation.

Elsewhere both authors have argued that a continuation of the policies from a business-as-usual approach may result in a dangerous climate change and in human catastrophes during this century. They have instead suggested to develop an alternative sustainability paradigm (Clark et al. 2004), a strategy for a long-term transformation towards a sustainability transition (Grin et al. 2011), for a new social contract for sustainability (WBGU 2011) or for a fourth 'sustainability revolution' (Oswald Spring/Brauch 2011) that calls for conceptual work for moving towards a decarbonized and a dematerialized world with social equity and solidarity that may overcome the past five decades of global destruction and thousands of years of patriarchy.

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